A. E. FOOTE'S CATALOGUE OF MINERALS

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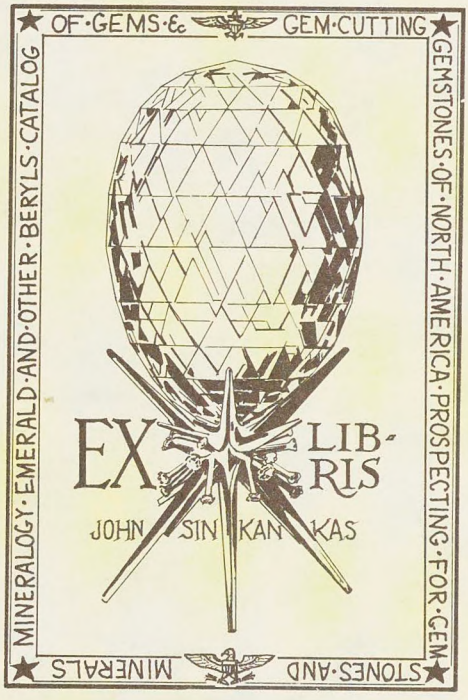

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Nov 1954

CATALOGUE

OF

MINERALS.

A. E. FOOTE,

No. 1223 Belmont Ave., Philadelphia, Pa.

EIGHTH EDITION.

PROF. A. WINCHELL, Professor in Geology in Michigan University, formerly Vice President of the Am. A. A. Science and Chancellor of Syracuse University, says:—"Your catalogue is perfectly unique and answers equally for catalogue and manual of Mineralogy."

Commencing in business in 1876, I received the only award and medal for "collections of minerals" that was given to any American at the Centennial; and have since received Awards, Diplomas and Medals at New Orleans, London, Cincinnati and other cities. I believe I have the largest stock of Minerals in the world; and I have also the largest stock of Scientific, Medical, Agricultural and Horticultural books.

1889.

INDEX.

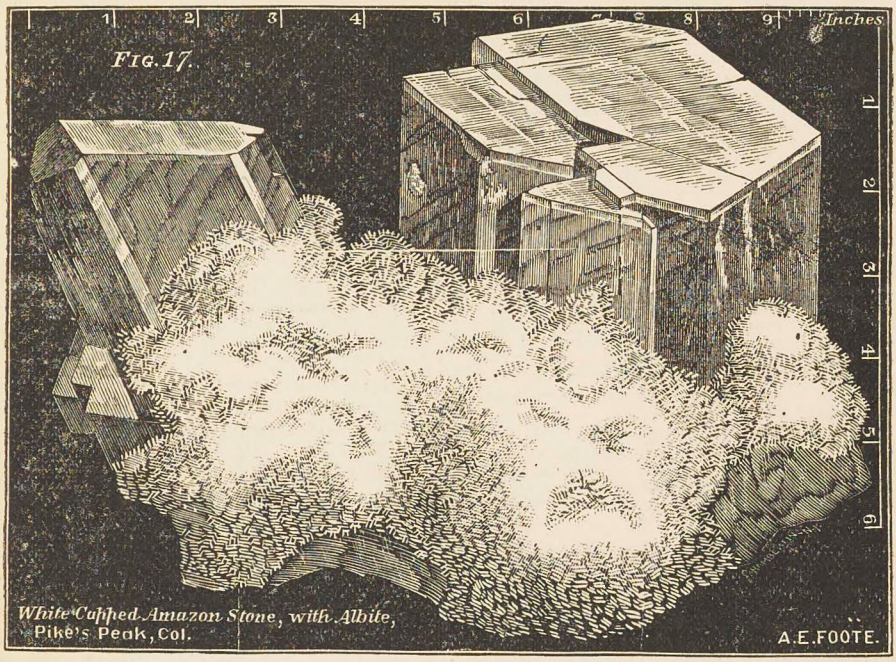
PAGE

Acidic and Basic Feldspars, 57
Adularia, 59
Agate, Moss, Fortification, etc., 66, 67
Agriculture, Collections of Minerals used in, 68
Albite, 58
Amazon Stone, illustrated, 59
Amethyst, 5
Anorthite, 57
Apophylite, 5
" Rose colored, 5
Argentite, 4
Arizona Minerals, 4
Assaying, Book List on, 83
Asteriated Quartz, 65
Azurite, 4
" pseudomorph, 4
Basanite, 65
Biography, Book List on, 86
Bloodstone, 59
Blowpipe, Analysis, Book List on, 83
" and other Minerals by the pound, 68
Book Abbreviations, 14
Book Lists on Mineralogy, etc., 15 to 22, 69 to 97
" Where found, 6
Brazilian Pebble, 66
Brochantite, 4
Cacoclasite, illustrated, 89
Cairngorm Stone, 65
Calcite, Twin, 5
California Minerals, 3
Cassiterite, 5
Catseye, 66
Chalcedony, 67
Chert, 65
Chemical Manufacture, Collections of Minerals used for, 68
Chrysocolla, 4
Chrysophrase, 67
Citrine, 65
Classification according to Crystalline Form, 55
Coal and Coal Oil, Book List on, 90 to 95
Collections of Minerals, 9, 10, 11, 12, 68
Color, Table of, 52, 53
Copper, Book List on, 78
" Minerals, Collections of, 68
Covellite, 4
Crystal, illustrated, 65
Crystallization, 8, 9
Crystallographic Series, Collections of, 9
Crystallography, Book List on, 86
Cuprite, 4
Cuprodescloisite, 5
Descloisite, 4
Dumortierite, 4
Embolite, Silver Chlorobromite, 62
European Minerals, 5, 6
Extra Rare and Valuable Books, Mineralogy, 12
Feldspar, full account, illustrated, 57, 58, 59
Felsite, 59
Ferruginous Quartz, etc., 66
Flint, 67
Fusibility, Collections of Scale of, 12
Gadolinite, 5
Garnet. White, 63
Gems, 6
" and Ornamental Stones, Book List on, 84
Gold and Silver, Book List on, 75, 76, 77
" and Silver, Minerals, Collections of, 68
Greasy Quartz, 66
Guanajuatite, 5
Hanksite, 3, 4
Hardness, Table of, and Collections of, 54
Heliotrope, 66
Hornestone, 67
Hydrotitanite, 60
Indianite, 57
Iron, Book List on, 71, 72, 73, 74
" Minerals, Collections of, 68
Itcolumite, 67
Jasper, 67
Labradorite, 57
Lead, Book List on, 70
" Minerals, Collections of, 68
Local Mineralogy, Book List on, 87, 88, 89
Light and Heat, Collections of Minerals used for, 68

PAGE

Lime Soda Feldspar, 57
Lithology, Book List on, 95, 96, 97
Love's Arrow, Fleche d'Amour, 60
Loxoclase, 58
Malachite, 4
" pseudomorph after Azurite, 4
Mazapilite, 4, 53
Medicines, Collections of Minerals used in Manufacturing, 68
Menaccanite, 60
Metallurgy, Book List on, 69, 70
Meteorites, 5
" Book List on, 79, 80
Mexican Minerals, 4
" Onyx, 5
Microcline, 58, 59
Milky Quartz, 66
Mineralogical Books Wanted, 6, 7
Minerals by the Pound, 68
" for the Microscope, 32
" New Arrivals, 3
Mining and Mining Localities, Book List on, 19, 20, 21, 22
Naturalists' Leisure Hour, Specimen page, 3
Obsidian, 5
Of General Interest, 1, 2
Oligoclase, 58
Opal, 4
" Agate, 5
" Harlequin, 5
" Milky, 5
Ornamental Arts, Collection of Minerals used in the, 68
Ores and Metallic Minerals, Collections of, 68
Orthoclase, illustrated, 58, 59
Paramorph of Rutile after Arkansite, illustrated, 61
Pearlite, 5
Perofskite, 60
Petrified Wood, 67
Plasma, 48
Poem. A Fire Opal, 3
Polybasite, 4
Porcelain Jasper, 67
Porphyry, 57
Price List of Collections, 13
" of Specimens, 23 to 32
Pseudomorphs, Price List, 32
Pyargyrite, 4
Quartz, illustrated, 65, 66, 67
" containing bubbles, 5
" pseudomorph, 5
Rose Quartz, 65
Rutile, 63, 64
Sagenitic Quartz, 66
Sanidin, 45
Sardonyx, 67
Scientific and Valuable Books, 7
Sets of Journals, 7
Shipping Directions, 2
Silver, Book List on, 75, 76, 77
Silicious Sinter, 67
Smoky Quartz, 65
Special Collections, 68
Species, Check List of, 23 to 32
" Table of New Mineral, 48, 49, 50, 51
" Book List on Original Descriptions of, 83
" Table of Properties of, 33 to 47
Specific Gravity, Minerals arranged according to, 56
Steel, Book List on, 71, 72, 73, 74
Stephanite, 4
Sulphohalite, 51
Sunstone, 67
Tin, Book List on, 70
Titanite or Sphene illustrated, 63
Titanium Minerals, illustrated, 60
Tourmaline, Brown, 5
Valencianite, 5
Vanadinite, Brown, Barrel-shaped, 4
" Red, 4
Variscite, illustrated, 64
Venus's Hair stone, 60, 66
Verd, Antique, 59
Wulfenite, Red, 4
" Yellow, 5
Zinc Minerals, Collections of, 68
Zircon, Twinned, illustrated, 64
Zonochlorite, illustrated, 62

OF GENERAL INTEREST.



When the first edition of my Catalogue was printed (1876), it was with the greatest reluctance that I issued it, as I knew that the tremendous pressure of Centennial work had prevented me from giving it the proper revision and supervision even in proof reading.

Feeling as I did its many defects, the high commendation that it received and the 6,000 copies that have sold for *cash*, have been a source of great gratification to me. I have constantly improved it and decreased the price, until this edition will be sent free to every customer requesting it, and the heavy paper and bound copies will be sent at as near the actual cost of paper and binding as we can make them. I can still say that in preparing this Catalogue it has been my aim to make it of such value that no chemist or mineralogist, whether amateur, student or Professor of Mineralogy or Chemistry, would feel as if he could afford to be without it, and in doing this, I have spared no expense, either in the way of illustration or labor.

The articles on Microcline or Amazon Stone, Hydrotitanite, Protovermiculite, Variscite, Astrophyllite, Mica, Feldspar, Quartz, Diamond, Jet, Leidyite, Cœruleolactite, Paramorphs of Rutile after Brookite, Randite, etc., etc., are worth three times the price. My previous Catalogue received the highest commendation from scientific men everywhere (see the note from Prof. Winchell on title page). In this I have corrected some mistakes found in the other, and more than quadrupled the amount of purely scientific matter. Attention is called to the fact that, owing to the fine print used, it contains more than double the matter of most books of the same size. A new book containing so much purely scientific matter has very rarely if ever before been published for $1.00. Over 30 of the pages cost me from $15.00 to $25.00 each before a single copy was printed. Every engraving and wood-cut used was made expressly for me, except the few used to illustrate Feldspar, and part of those illustrating crystallography, which are from Dana's Manual of Min. and Lith., price $1.75.

The stock now consists of over 100 tons and over 700,000 specimens, mainly crystallized, and such massive things as Agate, Chlorastrolite, Schorlomite, etc., that are only found massive. Having now letters on file from over 21,500 different correspondents all over the world, most of whom are customers, my facilities for getting anything desired on short notice are unsurpassed, and I doubt if they are equaled.

Collecting every mineral at the localities where it is found in the best specimens and the greatest abundance and in ton quantities where possible, most species can be furnished at lower rates than they have hitherto been sold for.

I made eight trips and spent over a year's time and $5.000 cash at the Amazon Stone locality alone; have made five trips to Mexico, and spent over six months collecting there; nearly a year in Arkansas and Missouri, and many months in Arizona, California, New Mexico, Canada, New Jersey, New York, Illinois, Georgia, Pennsylvania, North Carolina, etc., etc. In Europe I have spent much time in Hungary, Cornwall, and other mining regions. I shall always make a specialty of collecting new and rare specimens.

An examination of the character of my elementary collections and the minerals sold in quantities, will show that they are far lower than hitherto advertised by other dealers. The accurate labelling of every specimen is guaranteed.

As the correct naming of the specimens will be the most important part to many who will see this Catalogue, I feel myself justified in mentioning that I have been a collector of minerals for twenty-seven years; that I was a student under Prof. Wolcott Gibbs at Cambridge and Prof. A. Hoffman, at Berlin. I was also Instructor in Michigan University and Professor in Iowa State Agricultural College, in Chemistry and Mineralogy, for six years.

Every specimen in my establishment is plainly labelled with the price, species number, and in most cases the composition also. Nine-tenths of the specimens are labelled with printed labels that cannot be removed except by long soaking.

I aim to put all the specimens at the lowest possible price. There is no variation from the marked prices. This has been our invariable rule on books from the start, and we shall make it invariable in our mineral department hereafter. The printed price is affixed so that customers may know that, unlike most other dealers in this line, I do not vary my prices from time to time as occasion demands or the individual asks. It also guarantees to every individual who exchanges with me that they will get exactly the same prices as if they gave cash. It is a gratification to me that this plan has lately been adopted by many dealers. I will allow any person buying any article to return it within one week and take anything else they wish to the same amount or refund their money, less ten per cent. to pay for the trouble of handling (if they are not satisfied). Of course, if mistakes are made or the articles are not exactly as represented,

the money will be refunded without reduction, on the return of the articles, or others sent in place, as may be preferred by the customer. Giving up a lucrative profession to go into this business because I liked it, I have not been disappointed, and now expect to continue in it throughout life, and hope that my children may continue it after me. I do not believe that I can afford to have any customer dissatisfied, and prefer to lose rather than to have any person feel that I have not treated them justly. It will always be taken as an especial favor if any cause of dissatisfaction is immediately reported to me. My success has been due to the kind recommendations of the leading scientific men everywhere.

Prof. E. S. Dana, in a letter says: "I wish you every success, and consider that you have done a great deal toward the extension of a knowledge of mineralogy in this country."

From the late President of American Association for the Advancement of Science:

Louisville, Ky., Aug.

PROF. FOOTE—Dear Sir: It is with great pleasure that I consent to your using my name for reference, as being of great use, both to the scieutific and amateur naturalist.

Yours truly, J. LAWRENCE SMITH.

I have received similar letters from Dr. Joseph Leidy, Prof. S. F. Baird, and many others.

University of the State of Missouri, Columbia, Mo.

PROF. A. E. FOOTE—My Dear Sir: I feel that all scientists owe you a debt of gratitude for your labors in bringing together so vast a collection of minerals, and selling them so cheap that every student of science may have a collection. Yours, etc.,

G. C. SWALLOW, Dean of Tech. Faculty.

The systematic collections, of which over 9,000 have been sent all over the world, are sold at less than one quarter what any such collections were sold at before we commenced business, and are still more than twice as good as any one else furnishes at the same price.

Drury College, Springfield, Mo.

I wish to thank you for the valuable collection of minerals which you sent me. You are doing a good work for students by bringing these cheap sets within their reach. Very respectfully yours,

E. M. SHEPARD (Prof.).

Windham, Ohio.

PROF. FOOTE—Dear Sir: I received the amateur collection, 100 minerals, that you sent me yesterday, and it was an agreeable surprise. The beauty and size of the specimens astonished me. I never expected to be in possession of any such collection, and I fear you are not well paid. If not I will send you more money, for I would not take twice what it cost me. I express my great obligations to you with thanks, until better paid.

Yours, very respectfully, A. JAGGER.

See references in advertisement.

No such list of Mineralogical books as those in this Catalogue has ever been offered for sale before to my knowledge, and a few out of a large number of pleasant letters are appended:

University of Ohio, Columbus, O.

PROF. FOOTE:—The books came to hand all correct, and you have my thanks for promptness. The books are a bargain. Yours very truly,

PROF. S. W. ROBINSON,

Sandwich, Ill.

PROF. A. E. FOOTE:—Invoice of books came to hand all right. Original cost when published $9.00 per vol. Now the set of 3 vols. costs only $5.00. Books are in excellent condition, paper superior, illustrations capital, print very fine indeed. A good bargain; an inexpensive method of obtaining valuable editions of a classical character, and, the best of all, so cheap.

Respectfully yours, NAHUM A. BALLOU, M.D.

University of the City of New York, Medical Dep't., No. 410 East 26th Street, New York.

MY DEAR SIR:—We get the BULLETIN, and it is a matter of surprise that so much can be gotten into so small compass. The books ordered by Prof. Arnold came O. K., and the price was remarkably low. *We can get no such quotations from second-hand dealers here.*

Very Respectfully, M. N. MILLER, M.D.

Demonstrator of Practical Physiology.

A. E. FOOTE, M.D., 1223 Belmont Ave., Phila., Pa.

Our price list of Minerals and Mineralogical books is sent free to all.

A large number of postal card inquiries for Catalogue receive no notice, as I suppose them to come from school children who wish to gratify a little idle curiosity. It is sent on receipt of price which is below cost, or free to Museums and heads of Natural History or Chemical departments in colleges applying for it on their official paper, or intending purchasers writing on headed paper. The price paid will be credited on the first purchase if requested. Sample copy of the LEISURE HOUR sent free to any one. To insure a prompt reply postage should always be enclosed. It is a small matter to you, but our postage bills amount to between $200 and $300 each month.

The kindness of scientific men everywhere has been acknowledged, but credit must be given to Profs. Dana, Eggleston, and Brush for the free use that has been made of their works on Mineralogy in preparing the lists, tables, and various articles in the Catalogue, and to Prof. J. W. Judd for an urgent invitation to display our collections in the South Kensington Museums.

Competent assistants supplied to private collectors who wish to visit interesting localities. In most cases payment for services can be made in specimens. Collections named and arranged at very low rates.

Shipping Directions.

There are two principal lines of Express to Philadelphia, the United States and Adams. Parties living at towns where there is no line but the Adams, will, of course, have to send by it, but parties living at places where there is any other line are requested to ship by the other line. No packages *sent* by Adams, unless requested in the order for goods.

The following rules, which are those of the largest dealers in Mathematical, Optical, and Philosophical instruments in the United States, are those which we shall hereafter adopt:

"The prices throughout the Catalogue will be strictly adhered to.

"When no satisfactory Philadelphia or New York reference is given by the party ordering the goods, or if the order is less than $5, the money should accompany the order; but where it does not (either for want of confidence or other cause) the goods will be forwarded by express, with bill, C. O. D. (collect on delivery), provided a remittance equal to one-fifth of the total amount of the order be sent with it.

"The Express Company's charge for collecting and returning the money on C. O. D. bills must be paid by the party ordering the goods.

"The safest and most economical method of remitting money is by Bank Draft or check on Philadelphia, Boston, New York [illegible] or Post Office Order, made payable to me. Where neither of these can be procured, United States or National Bank Notes or Postage Stamps can be sent by express, or by registered letter, with safety, the sender prepaying the express charges.

Country checks not wanted, as our bank charges us for collection. If you have a bank account your bank ought to issue you a New York draft without charge.

"Goods ordered to be sent by mail must be prepaid, and the return postage included in the remittance.

"All the packing-boxes will be charged for, and all goods will be packed with the utmost care; but no responsibility will be assumed by us for breakage, loss in carriage, or other damage, after a package leaves our premises, except upon special contract."

Packing-boxes, with screw covers, not charged for if returned in good condition prepared.

There is nothing that I strive to exercise more care about than packing and shipping. I put able men at it, and unless accident and delay is very plainly my fault, I do not consider myself responsible.

In all cases customers must pay freight and postage.

The special attention of all visiting 1223 Belmont Ave. is called to the fact that my place of business is but eight minutes railroad ride from the Broad Street Station, Public Buildings and business centre of the city. That it is reached by Pennsylvania Railroad trains every half hour. The Chestnut and Walnut, Arch, Race and Vine street cars run by the door, and Market, Girard, and South street cars are near by.

All American books in print suppliod on order. Foreign books obtained to order in a few weeks. Of the second-hand books on my list I have generally only single copies, but when sold I replace them as soon as possible.

So far as I know, my arrangements for keeping watch of the needs of my correspondents are the most perfect that have thus far been devised.

Started in Sept 1879.?

Sample page of

1223 BELMONT AVE., N. 44TH ST.; Philadelphia, Pa. Opposite Girard Avenue Station, Pennsylvania R. R
Take Chestnut & Walnut Str. Cars, or Penn. R. R., Main Line West.

13TH YEAR. Monthly—75 cts. a Year.

SCIENCE AND PRACTICE.

No. 114, March, 1889.

A FIRE OPAL.

Iris dwells in thee and throws
Rays of leaf-green and of rose,
Limpid amber courseth through
Violet glooms of fading hue.

Opal, well surnamed of fire,
If some stranger should inquire
Whence thy swift caprices came
Morn-mist, closing evening-flame—
Do thou kindling answer bring,
Many-passioned lambent thing!
Say with cosmic throe was born
All thy life of love and scorn,
Yet not chance but deathless law
Bred thy beauty from a flaw.
Speak thou, too, with perfect art,
For wild Genius' burning heart,
Whose perfection springs, like thine,
From some touch of scath divine.

Edith M. Thomas in the Century.

The Amethyst—Freedom from Care.

The February-born will find
Sincerity and peace of mind,
Freedom from passion, and from care,
If they the Amethyst will wear.

MINERALS—NEW ARRIVALS.

Since the issue of my last Price List and Catalogue of Minerals, my stock has increased so remarkably that it is impossible to specify any except a very few of the most recent and important additions.

Much of my time in the last three years has been spent in collecting: three trips having been made to Mexico, and many to Arizona, New Mexico, California, and other western localities. Several weeks have been spent at interesting localities in Cornwall and the North of England, and much time at various localities in Europe. Besides, I have spent several hundred dollars in advertising in *Nature* and other English papers for specimens and collections. What results these efforts yielded is shown by the fact that in the three years since the last edition of my Catalogue was issued, I have received over 900 boxes of well crystallized specimens weighing over 50 tons.

The revisions in our new Catalogue we have been intending to make for years, but have not before from a lack of time. The mistakes have, so far as possible, been corrected, and the new species list will be almost indispensible to every working mineralogist until there is a new edition of Dana's System. This and the revision of the price list has alone cost me over $180 in my assistant's time, and many times as much in my own. Our price list, filling ten pages closely printed, is the most complete ever issued. No such list of books, pamphlets and excerpts for sale on the subjects of Mining and Mineralogy has ever been seen as those we now offer on over 30 pages.

This list alone is worth a year's subscription to the LEISURE HOUR. Many papers are catalogued that will not pay us for the handling, simply to make our lists as complete as possible.

A number of new species have been collected by us at various localities. The latest of these are Sulphohalite and Mazapilite, descriptions of which are published together with the new species list in our April bulletin. Price of March and April, on heavy paper, 5 cents each, light paper free.

CALIFORNIA MINERALS.

Many of the trips, like the one into the borax regions, near Death Valley, involved considerable danger and hardship. The shipping point for the borax regions is in the desert, and work is entirely stopped during the summer at Death Valley.

A weeks visit at Borax Lake (the best locality) secured the finest crystals of *Hanksite* ever seen. I shall give a full account of this interesting locality, with records of drill holes 300 feet in depth. A month before my visit an 8-inch well had been drilled to a depth of over 100 feet for the purpose of exploring the immense alkaline deposit. At the depth of 35 feet a small cavity was struck, from which were pumped through the drill hole the finest crystals ever seen. In these the pyramidal planes were much more developed than in the crystals originally described. There were only a few of these that were perfect, the most of them being broken by the drill. All of these, except a very few given to one person before I arrived, I secured.

Besides the value these "drill-hole" crystals have from their size and perfection, it is exceedingly probable that this form will be quite rare, as it was the first time it had been found since the deposit was first worked, over fifteen years, ago, although other wells had been sunk previously. Crystals and groups of this form $1,00 to $15.00 each. From the same cavity was pumped the new species *Sulphohalite.*

The form indicated in figure 1 of the original description (see page 64 of the Fifth Annual Report of the California State Mining Bureau) was found about six years ago, and has not been met with since. We have a few good crystals 50c. to $2.50 each. These have readily sold heretofore for $5.00 to $7.00 each.

The groups similar to Aragonite, see figure 2 same page, are more common. In them the pyramidal planes are almost obliterated. Groups 25c. to $5.00. Extra large museum groups $5.00 to $10.00.

As all these specimens were secured by me at the locality, they were oiled by me on the spot, and do not present the rounded or worn appearance usually shown.

The finely crystallized *Trona* is very desirable 50c. to $5.00 As Borax mining has not paid, *Colemanite, Thenardite,* and other alkaline minerals, will probably be more scarce in the future than in the past. The *Colemanite* dumps were thoroughly worked, and yielded us some good specimens, but the best we got came from a collection made several years ago. Cleavages, price 5c. to 25c.; crystals 10c. to .50.; fine groups of crystals 50c. to $10.00. *Thenardite* in fine crossed crystals, 5c. to $1.00. We have also *Borax, Halite, Glauberite,* and other alkaline minerals from San Bernardino Co., at from 25c. to $1.50.

ARIZONA MINERALS.

Descloisite from *Pima Co.*—From a collector we obtained the finest crystallized specimen of this rare mineral that has ever been seen. It weighs 9¼ lbs., measures 9¾ inches in length and seven in diameter, $100.00; smaller well-crystallized specimens, some associated with Vanadinite crystals, $2.00 to $10.00; fragments well crystallized, 10c. to $1.50. All the above are from a silver mine no longer worked.

Vanadinite doubly terminated crystals, with straw-colored centres and red terminations on good pieces of gangue, Pima Co., $1.00 to $5.00; fragments well crystallized, 10c. to 75c.

I obtained the finest lot of red Vanadinite that has ever been seen from Yuma, and at prices so reasonable that I can sell them at less than one-half what they have ever been sold at before. Beautiful specimens from 50c. to $15.00. Small pieces very choice for the microscope, 10c. to $1.00.

We have also some red skeleton crystals similar to the Pyromorphite from Ems that are the largest Vanadinite crystals ever seen—25c. to $2.50, each. Also, straw-colored crystals from the same mine.

Brown Barrel-shaped Vanadinite crystals were obtained by me at the mine at such low prices that we are able to sell them at from 25c. to $5.00 per specimen. Small fragments showing perfect crystals, 5c. to 25c.

Wulfenite Red.—Another hard trip to the Red Cloud mine enabled me to secure some specimens that the superintendent had been saving for me for over a year. As the district is now almost entirely abandoned, and no more good specimens are now found at the mine, I was very glad to secure these, as I had sold all that I had taken to Europe. Large specimen groups, $1.00 to $25.00; fragments and crystals, 5c. to $1.50.

Dumortierite.—I secured the finest specimens ever seen of this beautiful new species when I was in Yuma Co., and can offer them at exceedingly low prices considering the quality. Good specimens of bright blue color 10c. to $5.00.

From the Copper Queen mine and from Morenci I have obtained the finest *Azurites* and *Malachite pseudomorph after Azurite* ever seen. Some of the *Azurite pseudomorphs* have the surface a brilliant blue, and the entire centre of malachite, the aciccular *Malachite* in some cases growing out of the brilliant blue faces. Specimens, 10c. to $7.50.

Malachite fibrous in beautiful surfaces and tufts, 5c. to $5.00; same penetrating clear calcite, 25c. to $10.00; Malachite polished, 50c. to $3.00; Malachite and Azurite banded in a charming manner, 75c. to $5.00.

Chrysocolla, with very glossy, lustrous fracture, the finest ever seen, 10c. to $5.00.

Cuprite, very brilliant, and finer than the Cornish, 50c. to $5.00. Small fragments for the microscope, &c., 5c. to 35c.

Azurite in perfect balls of crystals, 5c. to $1.00.

Azurite in groups and crystals, 5c. to $10.00.

Brochantite, good crystals, 25c. to $5.00.

Covellite, good specimens, 15c. to $1.50.

THE MEXICAN MINERALS

are the result of the purchase of six entire collections of mining engineers and experienced collectors, and the choice of all the specimens in the collection of the Professor of Mineralogy in the Mining College of Guanajuato. These purchases, made on my last trip, aggregated several thousands of dollars.

Besides the Mazapilite (described later), I can mention the finest *wire silver* that I have ever seen for sale, 6½ inches long, from an Argentite base, $75.00. Another 2½ inches long, has crystals of calcite beautifully strung along it, $7.50. Smaller wires on and off the gangue from 5c. to $5.00.

Polybasite crystals and groups on the gangue, 50c. to $10.00.

Argentite fine crystals, separate and on the gangue, 10c. to $10.00.

Stephanite, $1.00 to $5.00.

Pyrargyrite fine crystals and groups, $1.00 to $15.00; small crystals, 10c. to 75c.

Opals.—The wonderful popularity of this beautiful stone is fully justified by its extraordinary loveliness. I brought back from Mexico this time the finest lot of these I have ever seen for sale. We have them of all kinds, *precious,* or *noble, fire, harlequin, milky, opal agate, opal with inclosures, hyalite, etc.,* cut and in the rough, from 5c. to $50.00.

Our *Cut Opals* vary from ¼ inch to ¾ inch in diameter, and from 25c. to $6.00 in price. Besides these we have the following very extraordinary specimens, suitable for setting.

A magnificent specimen fire opal, 1½ inches in diameter, price, $35.00.

Very perfect fire opals, exceedingly rich, $1.00 to $12.50; smaller, 25c. to 75c.

Harlequin Opal, brilliantly spangled with red, blue, and green, ¾ in. by ½ in., perfect, $50.00.

Precious *Milky Opal*, brilliantly clouded with red, green and blue ¾ of an inch by ⅝ inch, $30.00.

> Milky opals that gleam and shine
> Like sullen fires in a pallid mist.
>
> RUSKIN.

Opal Agate from the State of Jalisco is especially noteworthy, from the charming manner in which the soft shades of pink, green, and yellow are blended, 10c. to $1.50. On our visit to Guadalajara, with the excursion given by the State of Jalisco, we obtained a number of good things.

Pearlite var Sphaerulite and *Pitchstone*, from $10c. to $10.00.

Obsidian, mottled with red (*Marekanite*), from 5c. to $1.00.

The *Twin Calcites* that we obtained at Guanajuato are more interesting in form than any we ever had before. Some (like Fig. 566, Dana's System) are doubly-terminated, rose-colored, and associated with a different form, from $1.00 to $10.00; others are almost heart-shaped (like 572 Dana's System), 25c. to $5.00; others, smaller, from 10c. to $1.00; some chocolate colored, 25c. to $1.50.

Rose calcite twin, the finest ever seen, diameter 6½ inches, $50.00.

Quartz pseudomorph after calcite, 25c. to $1.00.

Quartz, containing moving bubbles, 50c. to $2.50.

Amethyst, some very fine, 10c. to $5.00.

Apophyllite, 12½ x 10 inches, very fine surface, entirely covered with large crystals, $50.00.

A smaller, very gemmy specimen, $50.00.

Others *very nice*, smaller, 50c. to $10.00.

Rose colored *Apophyllite*, $3.50 to $20.00.

Valencianite, from the old Valenciana mine, in fine museum specimens, one 11 inches by 6 inches, $20.00.

Others a little smaller, $2.50 to $10.00.

Others smaller, 15c. to $2.00.

Guanajuatite, $1.00 to $10.00.

Cuprodescloisite, from Mexico, 25c. to $2.00.

Cassiterite, both tinstone and large masses, 25c. to $10.00.

Mexican Onyx, beautifully banded, 25c. to $2.50.

We again visited the celebrated *Turquois* locality in *New Mexico*, and have some of the finest deep blue pieces we have ever seen, 10c. to $5.00.

In *New Mexico* we were very fortunate in striking a pocket of brilliant *yellow Wulfenite* equal to the best ever found at Eureka, Nevada.

It is associated with flos ferri. The thin and delicate plates are very beautiful. Specimens, $2.00 to $10.00; fragments, brilliant, 10c. to $1.50.

Gadolinite, from *Texas*, in crystals and masses, 25c. to $10.00, each.

Also, a new material from the same locality, that is now being investigated.

Minerals from other American localities have been received in large quantities, among the most interesting are the crystals of Magnetite from the Moriah Mine, Essex Co., N. Y.

These so-called interrupted crystals have been worked out of the solid ore with great labor, and are only occasionally met with. They occur in almost all possible modifications of the octohedron, even to an apparent rhomb, 5c. to $1.00. Very powerful masses of *loadstones*, lifting railroad spikes, $10.00 to $15.00; smaller, 10c. to $5.00.

A very full assortment of Phenacite, Bertrandite, Guitermannite, Zunyite, Megabasite, Conichalcite, Clinoclasite, Tyrolite, and the other Utah copper minerals.

A few small fragments of the Nelson Co., Ky., Meteorite, up to five and one-quarter ounces in weight, that were broken off in Kentucky before the main mass (now in the Vienna Museum) was sold, from 25c. to $50.00.

From Franklin I have recently obtained the largest brown *Tourmaline* group ever seen, price, $25.00. Also, a large number of very nice green Tourmalines, 10c. to $1.50. Very fine Franklinite, Troostite, Automolite, Dysluite, Jeffersonite, Anomolite, Chalcophanite, Bementite, Zincite, Tephroite, Chalcozincite, and other minerals peculiar to this interesting locality.

Very fine lots of twin feldspars, staurolites, Zircons, and rutile just received.

EUROPEAN MINERALS.

These minerals were not purchased in the usual way of simply visiting the dealers in the large cities, but over $100 was spent in advertising for collections. Much time was devoted to visiting the various localities,—two weeks in Cornwall, several weeks in Austria and Hungary, much time in Cumberland and the north of England, where we paid one collector over $1,000, who had either mined the specimens himself or had bought them from the miners. We are, therefore, able to price them at far lower rates than could be offered by those who merely make the circuit of the great cities, buying their material in London, Paris, Vienna, and Berlin, after they have already paid several profits.

I venture to say that the *green Fluors*, some with *bubbles*, other colored Fluors, Barites, Rhodocrosites, Witherites, Alstonite, Barytocalcite, Tellurium, and many other minerals are offered at the lowest prices ever known in America. The doubly terminated Witherites are especially remarkable, $1.50 to $10.00. Siderite, the finest crystals ever seen, from the Tincroft and other Cornish mines, 5 cents to $5. The other Cornish minerals were obtained almost entirely from old collections, either purchased outright, or as duplicates, from two of the best Cornish collections known. The owners of these collections would have paid me cash, but I much preferred to take exchange in order

to have the material for my American customers. Among them were Liroconites, Bismuth native, Bismuthinite, Bornite, Redruthite, Chalcopyrite, Blister Ore, Childrenite, Pharmacosiderite, Chalcosiderite. Cronstedtite, Clinoclasite, Libethenite, Olivenite, Torbernite, Autunite, Connellite, Ludlamite, Stannite, Liskeardite, Enysite, Langite, Cassiterite pseudomorph after feldspar, Condurrite, Tetrahedrite, Bournonite, Fluorite, Cuprite, Gothite, Axinite, Pyromorphite, Chalcophyllite, Scorodite.

From other European localities we have Gold, Arsenic, Allemontite, Bismuth, Sulphur, Orpiment, Sphalerite, in yellow crystals, and the resinous brilliant cleavages of Spain, Celestite, Linnaeite, Cobaltite, Niccolite, Pyrite, Arsenopyrite, Magnetic Sand, Psilomelane—very fine—Elastic Bitumen, Hatchettite, Ozocerite, Galena pseudomorph after Pyromorphite, Bismutite, Aerinite, Ardennite, Napoleonite, Fibroferrite, Leadhillite, Alexandrite, Sylvanite, Nagyagite, Matlockite, and Phosgenite, Amethyst, showing internal markings (Phantom Crystals).

Crocidolite, in the natural, unaltered blue fibres and Quartz pseudomorph after Crocidolite from a land owner in South Africa, at the lowest price that has ever been known. We can furnish the material in the rough at from 10 cents to 25 cents per pound. Besides the ordinary seams sawed up into slabs, we have fibres of golden yellow color interlaced with the unaltered blue fibres. This is usually considered far more beautiful than the ordinary variety, on account of its greater play of light and shade.

Rhodonite, polished, from Franklin, N. J., and from Russia, in slabs of the finest color ever seen, Epidote, Gadolinite, Axinite, Labradorite, Baverno twins, Cinnamon Stone, Diopside, Andalusite, Euclase, Adularia, Green Sphene, Dioptase, Adamite, Cupreous Calamine, Prehnite, Tetradymite, Sodalite, Ludwigite, Krennerite, Chalcedony Geodes containing fluid, $3.00. Nagyagite, many pseudomorphs, Batrachite, Brandisite, Scheelite, Zinnwaldite, Leonhardite, Bournonite, Tetrahedrite, Manganocalcite, Diaphorite, Enargite, Greenockite crystals, Manganite, Herrengrundite, Crocoite, Sammet Blende, Cronstedtite (Kuttenberg), Aragonite (Cumberland, Aragon, Bilin, Bex, etc.), Harmotome, Pucherite, Anglesite, Pyromorphite, Vesuvianite, Mimetite, Erythite, Wolframite, Linarite, Lapis Lazuli, from Chili and Persia, Cerussite, Pandermite. See price list for prices.

GEMS.—Besides the very beautiful Malachite associated with Azurite, from Arizona, 25 cents to $5, we have a fine lot of the precious Opal Agate, 25 cents to $5; Turquoise, very deep color, 25c. to $5.00; some fine Star Sapphires and Corundum Cat's Eyes, 50 cents to $10, and Blue Sapphires from Ceylon, 25 cents to $5; fine Moonstones from Ceylon, 10 cents to $1; Crocidolite balls, cubes, etc., for pins, charms, sleeve buttons, etc., 5 cents to $2; Labradorite horse shoes, balls, sleeve links, etc., 75 cents to $1.50; Topaz, 75 cents to $5; Emeralds, $2.50, upwards; Aquamarines, 10 cents to $5; Gem Opals, 25 cents to $5.

Especial attention is called to the lists of *Pseudomorphs* and *Minerals for the microscope* that are published at the end of the price list. The latter especially includes only a few out of a large number of species fitted for microscopic examination.

WANTED.—Epidote, even massive, Arsenopyrite, Topaz, red and brown Ochres, Pyrolusite Anhydrite. Dolomite, Millerite, etc.

BOOK LIST—WHERE FOUND.

Mineralogy, Mining, Metallurgy & Price List of Minerals, March & April, 1889.
Brain and Nerve, Urinary, Venereal, Skin, Eye, and Ear diseases, January, 1889.
Anatomy and Physiology, Surgery, Medical Microscopy, Medical and Physiological Chemistry, Domestic Medicine, Hydropathy, Dec., 1888.
Obstetrics, Practice, Cholera, Fevers, Medical Books wanted, November, 1888.
Hygiene, Water, Food, Yellow Fever, Oct., 1888.
Ethnology and allied subjects, Slavery, Geology, and Official Geological Surveys Addenda, General Science, Domestic Economy, May, 1888.
Entomology, Mammalogy, Ornithology, and Miscellaneous Zoology, March, 1888.
Microscopy, Foreign Travels, Chemistry and Chemical Technology, September, 1887.
Conchology, Invertebrata, Zoology, July 1887.
Mammalogy, Ornithology, Ichthyology, Herpetology, June, 1887.
Botany, May, 1887.
Geology Addenda, Light, Heat, Physics, Electricity, Astronomy, April, 1887.
Medicine, supplementary, March, 1887.
Americana, North & Central, Nov. & Dec., 1886.
Geology and Palæontology, September, 1886.
Official Geological Surveys, August, 1886.
Education, Scientific Hist. and Biography, Sci. Dictionaries and Encyclopædias, May, 1886.
Technology, Am. Institute Trans., April, 1886.
Beneficial and Noxious Insects, Horticulture, Agriculture, Agl. Reports, Public Parks, Mar., 1886.
Journals, Publications of Scientific Societies, Popular Science Monthly, January, 1886.

MINERALOGICAL BOOKS WANTED.

The following books are no longer in stock; a good price either in cash or exchange will be paid for them:

Accum. Analysis of Minerals. 1st Am. ed., 1809; *Adam.* Tableau Mineralogique; *Am. Jour. of Mining*, ed. by *Dawson*, complete set; *Am. Mineralogical Jour.* ed. by *Bruce*, all pub.; *Anderson.* Theory of the Formation of Veins; *Ashley.* Copper Mines of Lake Superior; *Babington.* Mineralogy; *Bailey.* Mines of N. Y.; *Balch.* Mines, Miners and Mining Index of U. S.; *Barba.* Metals, Mines and Minerals; *Bergman.* Mineralogy, 1783; *Bickerstaff.* Cat. of Collect. of Minerals; *Bingley.* Minerals, 1818; *Blake.* Rare Cal. Minerals; *Blondel.* Les Bijoux des Peuples Primitifs; *Bolton.* Application of Organic Acids to the Exam. of Minerals; *Bombicci.* Museo Mineralogico; *Bowie.* Hydraulic Mining; *Browne.* Solid Meteors and Ærolites; *Buechner.* Meteoriten; *Castellani.* Antique Jewelry; *Cat. of Min.*

Collection of Literary and Hist. Soc., Quebec; Chilian Exhibit at the Centennial; Chism. Patio Process in San Delnas, Mex.; *Collins.* Mineralogy, 2 vol; *Combes.* L'Exploitation des Mines; *Cotta.* Ore Deposits; *Cronstedt.* Syst. of Mineralogy. 1st ed., 1772; *Crookes & Roehrig.* Metallurgy; *Dakota* Mining Reports; *D'Aumalie.* Report on Mines of Cieneguita Co., Mex.; *Davis.* Slate; *Delafosse.* Mineralogie; *De Rome de l'Isle.* Cristallographie; *Des Cloiseaux.* Manuel; *Dewey.* Testing and and Working Silver Ore; *Domeyko.* Mineralogia de Chile; *Drinker.* Treatise on Mining; *Drinker.* Tunnelling; *Dufrenoy.* Mineralogy; *Dudley.* Chem. Properties of Steel Rails; *Dyer.* Black Diamonds; *Egleston.* Diagrams to illustrate Lectures on Crystallography; *Fairchild.* Mineralogy; *Feuchtwanger.* Gems, col. pl.; *Foster.* Classification of Fossils and Minerals, London, 1740; *Gobet.* Ancient Mineralogists; *Grundriss der Mineralogie; Gregg & Lettsom,* Min. of Great Britain & Ireland; *Haidinger.* Treatise on Mineralogy; *Hall.* Cat. of Minerals of Vt., etc, 1824; *Hamlin.* Tourmaline; *Hanks.* Cuproscheelite; *Hanks.* Gold Nuggets; *Harrington.* Analysis of Rocks and Minerals; *Harris.* Value of Lehigh Coal & Nav. Co.; *Hazlitt.* Gold Fields of Caribooo; *Hunt.* Hydro-metallurgy of Copper; *Jackson.* Minerals and their Uses; *Jeans.* Steel, Hist. and Manufacture; *John.* Nat. Hist. of Amber; *Jour. of the Iron and Steel Inst.,* Vols. and Nos.; *Kenngott.* Lehrbuch der Mineralogie; *Kerr.* Gold Gravels of N. C.; *Kerr.* Mica Veins of N. C.; *King.* Stones from the Heavens; *Kobell.* Discrimination of Minerals by Simple Chem. Experiments; *Kuestel.* Nevada & Cal. Process for Silver & Gold Extraction; *Lawrence.* Lithology, Engl., French and German; *Lawrence.* Min. Localities etc. of Western States; *Lawton.* Mines & Minerals of Mich.; *Leeds.* Microsc. Examination of Silicates; *Leonhard.* Mineralogie u. Geologie, 3 vol.; *Linne.* Gen. Syst. of Min. Kingdom; *Lovell.* Pammineralogicon Oxford 1661; *Maclure.* Cat. of Min. & Geol. Specimens at Harmony, Ind.; *Mariposa Gold Co. Cal. Reports; Mawe.* Mineralogy of Derbyshire; *Mohs.* Mineralogy; *Mont Pyrenees Mineralogie; Montana Mining Reports; Murray.* The Diamond; *Pollen.* Gold and Silver; *Ponson.* Mines de Houille; *Pujoulx.* Popular Mineralogy; *Pumpelly.* Paragenesis of Rocks of Lake Superior; *Rath.* Paramorphosen von Rutil nach Arkansit; *Roy.* Coal Mines; *Rose.* Mineral Syst.; *Salero Mining & Man. Co., Arizona.* Reports by *Pumpelly et al.; Schweisser.* Syst. of Min.; *Silversmith.* Handbook for Metallurgists; *Smith.* Laboratory of Metals and Minerals; *Spargo.* Mines of Cornwall & Devon; *Staebner* Forms of Silica; *Thorpe.* Coal and its Uses; *Traill.* Quartz and Opal; *Triunfo Silver Mining Co. Cal.; Villefosse.* Richesse Minerale; *Wadsworth.* Min. of Boston & Vicinity; *Whittlesey.* Menominee Iron Region; *Whittlesey et al.* Reports on Phœnix Copper Co., Mich.; *Withering.* Mineralogy; *Woodward.* Papers for further Advancement of Knowledge of Minerals, etc., 1728; *Woodward.* Nat. Hist. of the Earth, especially Minerals, 1702; *Wright.* Production of Lake Superior Iron Mines.

SCIENTIFIC AND VALUABLE BOOKS.

Lindley & Hutton, Fossil Flora of Great Britain, 3 vols., rare, original edition, with 250 plates, $15.00; *Latham, J.,* General Synopsis of Birds, 10 vols., orig. ed., pub. at $50.00, our price $25.00; *Jasper,* Birds of N. Am., very fine copy, bound in hf. mor., pub. at $40.00, our price, $25.00; *Richthofen's* China. Ergebnisse eigener Reisen und darauf gegruendeter Studien, 3 vols.. 4to, many plates and folio Atlas, new, $25.00; *Michaux,* North American Sylva, 2 vols., 802 pp., 156 plates, hmor, 1819, very rare, $25.00; *Martyn,* New Dictionary of Nat. Hist., $3.50; *Albin,* Nat. Hist. of English Insects, col'd plates, calf, 4to., 1720, rare, $5.00; *Hofmeister,* Germination, etc., of Higher Cryptogamia and Fructification of Coniferae, 65 plates, $7.50; *Greville,* Algae Britannica, 19 col'd plates, half mor., $6.00; *Agassiz,* Mollusques Fossiles, 105 plates, $8.00, published at $24.00; *Mammat,* Geological Facts, etc., 102 colored plates, 4to, $3.50; *Kuetzing,* Species Algarum, half calf, $2.50; *Ruysch,* Theatrum Universale Ommium Animalium, 1718, folio, calf, $7.50; *Hind,* Report on Assiniboine and Saskatchewan Expedition, 1859, 4to, $10.00; *Thompson,* Bibliography of State of Ohio, 1880, $2.50; *Morison,* Plantarum Historiae Universalis Oxoniensis, 1738, folio, calf, $5.00; *Sennerti,* Opera, 1650, folio, calf, $5.00; *Holmes et al.* The Harvard Book, 57 portraits, 4to, half mor., $10.00; *Bramhall,* Military Souvenir, 91 steel plates, morocco, $3.00; *Gray,* Botany of Wilkes Expedition, Atlas alone, folio, hf. mor., $12.50; *Thornton,* Botanical Extracts on Philosophy of Botany, 3 vols., folio, morocco, full gilt, $15.00; *Cheselden,* Osteographia, or Anatomy of the Bones, 1733, $7.50; *Herschell,* Results of Astronomical Observations, 1834 to 1838, 4to, $7.50; *Tryon,* Manual of Conchology, vols. 1 to 7, 5 vols., hmor. 2 p., cost nearly $100.00, our price, $40.00; *Hoffy,* American Pomologist, 36 col'd plates, 4to, $2.50; *Flint,* Physiology of Man, 5 vols., $7.50; *Holmes,* Surgery, 3 vols., calf, 1881, $14.00; *Medical and Surgical History of the War,* 6 vols., $30.00; *Jeancon,* Atlas of Human Anatomy, folio, $12.50; *Evelyn,* Sylva, orig. ed., 1664, calf, $5.00; *Dixon,* Geology of Sussex, 1850, $5.00; *Jones,* Nests and Eggs of Birds of Ohio, 68 plates, 15½ by 17¼ inches, colored by hand, with text (only 90 copies produced), $350.00; Tenth Census of U. S., complete set $22.50; *Humboldt,* Nouvelle-Espagne, 3 vols., 4to, $12.00; Biographical Dictionary of Penna. of the 19th Century, 209 steel portraits, full mor., gilt, 4to, $5.00.

Special attention is called to the following sets of Journals at very low prices:

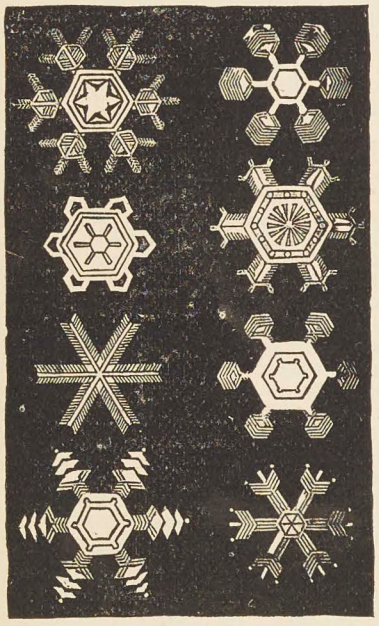
Nature, 36 vols., 1869 to 1887, $60; *Am. Jour. Sci. and Arts,* 127 vols., $200; *Am. Jour. Medical Sciences,* 120 vols., bound, $100; *Popular Sci. Monthly,* 28 vols., $35; *Am. Jour. of Obstetrics,* 1868 to 1887, $55; *Am. Naturalist,* 20 vols., $55; *Proceedings Am. Pharmaceutical Ass'n,* 1851 to 1884, $50; *Pacific R. R. Reports,* 13 vols., $15; *U. S. Agl. Reports,* 38 vols., $10; *2d Geol. Surv. of Penna.,* 81 vols., $40; *Smithsonian Reports,* 31 vols., $15; *Am. Journal of Pharmacy,* 1825 to 1885, $60; *Annals of the Lyceum of Natural History,* vols. 1 to 10, half morrocco, $25.

CRYSTALLIZATION,

Slightly altered and abriged from Dana's Manual of Mineralogy and Lithology. See 18636. $1.75

The attraction which produces crystals is one of the fundamental properties of matter. It is identical with the cohesion of ordinary solidification; for there are few cases outside of the kingdoms of life in which solidification takes place without some degree of crystallization. Cohesive attraction is, in fact, the organizing or structure-making principle in organic nature; it produces specific forms for each species of matter, as life does for each living species. A bar of cast-iron is rough and hackly in surface, because of the angular crystalline grains which the iron assumed as solidification took place.

A fragment of marble glistens in the sun, owing to the reflection of light from innumerable crystalline surfaces, every grain in the mass having its crystalline structure. When the cold of winter settles over the earth in the higher temperate and colder latitudes it



25—SNOW CRYSTALS.—System VI Hexagonal.

the signal for crystallization over all out-door nature; the air is filled with crystal flakes when it snows; the streams become coated with an aggegation of crystals called ice; and windows are covered with frost, because crystal has been added to crystal in long feathered lines over the glass—Jack Frost's work being the making of crystals. Water can not solidify without crystallization, and neither can iron nor lead, nor any mineral material, with perhaps a half dozen exceptions. Crystallization produces masses made of crystalline grains when it cannot make distinct crystals. Granite mountains are mountains of crystals, each particle being crystalline in nature and structure. The lava current, as it cools, becomes a mass of crystalline grains. In fact the earth may be said to have crystal foundations; and if there is not the beauty of external form, there is everywhere the interior profounder beauty of universal law—the same law of symmetry which, when external circumstances permit, lead to the perfect crystal with regular facets and angles.

Crystals are alone in making known the fact that this law of symmetry is one of the laws of cohesive attraction, and that under it this attraction not only brings the particles of matter into forms of mathematical symmetry, but often developes scores of brilliant facets over their surface with mathematical exactness of angle, and the simplest of numerical relations in their positions

Crystals teach also the more wonderful fact that the same species of matter may receive, under the action of this attraction, through some yet incomprehensible changes in its condition, a great diversity of forms from the solid of half a dozen planes to one of scores.

At the time of crystallization the material is usually in a state of fusion, or of gas or vapor, or of solution, In the case of iron the crystallization takes place from a state of fusion, and while the result is ordinarily a mass of crystalline grains, distinct crystals are sometimes formed in any cavities. If, in the cooling of a crucible of melted lead, bismuth, or sulphur, the crust be broken soon after it forms, and the liquid part within be turned out, crystals will be found covering the interior. Here also is crystallization from a state of fusion. When frost or snow flakes form, it exemplifies crystallization from a state of vapor. If a saturated solution of alum, made with hot water, be left to cool, crystals of alum after awhile will appear, and will become of large size if there is enough of the solution. A solution of common salt, or of sugar, affords crystals in the same way. Again, whenever a mineral is produced through the change or decomposition of another, and at the same time assumes the solid state, it takes at once a crystalline structure, if it does not also develope crystals.

Further, the crystalline texture of a solid mass may often be changed without fusion; e. g., in tempering steel the bar is changed from coarse-grained steel to fine-grained by heating and then cooling it suddenly in cold water, and vice versa, and this is a change in every grain throughout the bar.

Thus the various processes of solidification are processes of crystallization, and the most universal of all facts about minerals is that they are crystalline in texture. A few exceptions have been alluded to, and one example of these is the mineral opal, in which even the microscope detects no evidence of a crystalline condition, except sometimes in minute portions supposed not to be opal. But if we exclude coals and resins this mineral stands almost alone. Such facts, therefore, do not affect the conclusion that a knowledge of crystallography is of the highest importance to the mineralogist. It is important because,

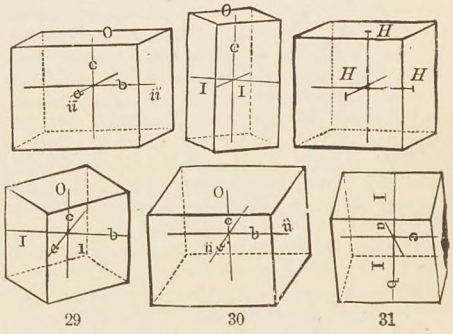
1. A study of the crystalline forms and structures of minerals is a convenient means of distinguishing species—the crystals of a species being essentially constant in structure and in angles.

2. The most important optical characters depend on the crystallization, and have to be learned from crystals.

3. The profoundest chemical relations of minerals are often exhibited in the relations of their crystalline forms.

4. Crystallization opens to us nature at her foundation work, and illustrates its mathematical character.

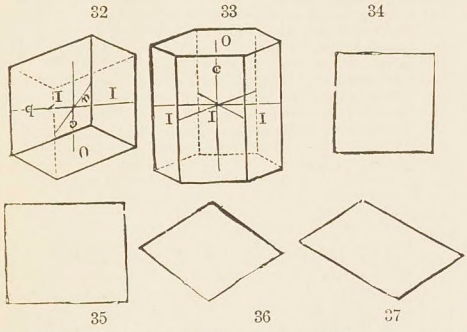
The forms of crystals are exceedingly various, while the systems of crystallization, based on their mathematical distinctions, are only six in number. Some of the simplest of the forms under these six systems are views represented in the following eight figures, and by a study of these forms the distinctions of the six systems will become apparent.



These prisms are all four-sided except the last which is six sided. In them the planes of the top and bottom and any planes that might be made parallel to

these, are called the basal planes, and the sides the lateral planes. An imaginary line joining the centres of the bases (*c* in figures 26 to 33) is called the vertical axis, and the diagonals *a* and *b*, drawn in a plane parallel to the base, are the lateral axes.

Fig. 26 represents a cube. It has all its planes square (like figure 34), and all its planes and solid angles, right angles, and the three axes consequently cross at right angles (or, in other words, make a rectangular intersection,) and are equal.



It is an example under the first of the systems of crystallization, which system, in allusion to the equality of the axes, is called the **Isometric** system, from the Greek, for equal and measure, see figs. 26, 34, 38, 39, 40, 41, 42, 43.

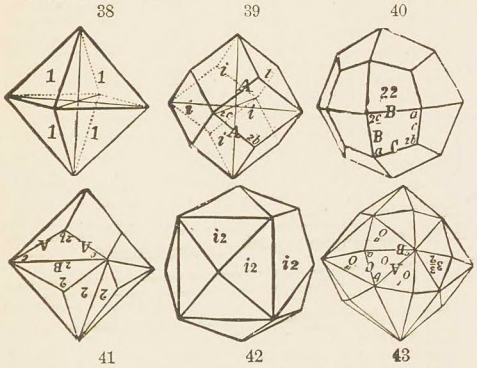


Fig. 27 represents an erect or right square prism, having all its plane angles and solid angles rectangular. The base is square or a tetragon, and consequently the lateral axes are equal and rectangular in their intersections; but, unlike a cube, the vertical axis is unequal to the lateral. There are, hence; in the square prism, axes of two kinds making rectangular intersections. The system is hence called, in allusion to the two kinds of axes, the dimetric system, or, in allusion to the tetragonal base, the **Tetragonal** system. Figs. 27, 19, 20.

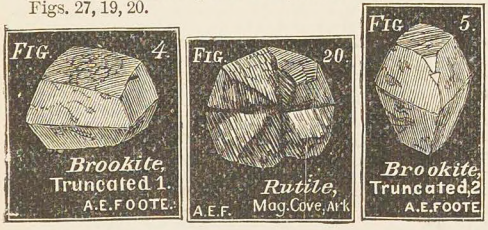


Figure 28 represents an erect or right rectangular prism, in which, also, the plane angles and solid angles are rectangular. The base is a rectangle (Fig.35) and consequently the lateral axes connecting the centre of the opposite lateral faces are unequal and rectangular in their intersections; and at the **same time** each is unequal to the vertical. There are **hence three** unlike axes making rectangular intersections; **and in** allusion to the three unlike axes, the system **is called** the trimetric system. It is also named, in allusion to its including erect prisms having a rhombic base the **Orthorhombic** system, orthos, in Greek, signifying straight or erect. See eosphorite, reddingite, &c. This rhombic prism is represented in fig. 29. It has a rhombic base, like Fig. 36; the lateral axes connected the centres of the opposite lateral edges, and hence they cross at right angles and are equal, as in the rectangular prism. This right rhombic prism is therefore one in system with the right rectangular prism.

Fig. 30 represents another rectangular prism, and Fig. 31 another rhombic prism; but unlike figures 28 and 29 the prisms are inclined backward, and are therefore oblique prisms. The lateral axes (*a b*) are at right angles to one another and unequal, as in the preceding system, but the vertical axis is inclined to the plane of the lateral axes. It is inclined, however, to only one of the lateral axes, it being at right angles to the other, hence, of the three angles of axial intersection, two are rectangular, namely, *a* on *b*, and *c* on *b*, while one is oblique, that is *c* (the vertical axis) on *a*. In allusion to this fact, there being only one oblique angle, this system is called the **Monoclinic** system, from the Greek for one and inclined. See Figs 30, 31 & 1 to 8 Brookite, pages 53 & 54, and 1 to 8 under Orthoclase, page 46.

Fig. 32 represents an oblique prism with a rhomboidal base, like Fig. 37. The three axes are equal, and the three axial intersections are all oblique. The system is called the **Triclinic** system from the Greek for three and inclined. See Figs. 1 to 8 under Albits, page 46 and Fairfieldite, etc.

Figure 33 represents a six-sided prism, with the sides equal, and the base a regular hexagon. The lateral axes are here three in number. They intersect at angles of 60°; and this is so whether these lateral axes be lines joining the centers of opposite lateral planes or of opposite lateral edges, as a trial will show. The vertical axis is at right angles to the plane of the three lateral axes, in as much as the prism is erect or right. The base of the prism being a regular hexagon, the system is called the **Hexagonal** system. See Figs 10, 11 & 12, page 47.

CRYSTALLOGRAPHIC SERIES.

Isometric.
1 Fluorite, Cubical.
2 Perofskite, Cubo-octohedral.
3 Garnet, Dodecahedral.
4 Leucite, Trapezohedral.

Tetragonal.
5 Zircon.
6 Idocrase.
7 Wulfenite

Orthorhombic.
8 Brookite
9 Staurolite, Twin.

Monoclinic.
10 Pyroxene.
11 Gypsum, v. Selenite.
12 Sphene.
13 Orthoclase.

Triclinic.
14 Microcline.

Hexagonal.
15 Quartz.
16 Tourmaline.
17 Apatite.

Double Refraction.
18 Iceland Spar, shows by its rhombohedral *Cleavage* that it belongs to the Hexagonal system

Fibrous.
19 Asbestus.

Stellated.
20 Wavellite.

Lamellar.
21 Muscovite.

Botryoidal.
22. Göthite.

Twin Crystal.
23 Rutile (Geniculated)
24 Calcite.

Pseudomorph.
25 Limonite after Pyrite.

25 specimens in a box, $1.00; larger, $2.50 to $5.00. 50 specimens in box, $5.00, or larger, $10.00 to $25.00.

A. E. FOOTE'S Collection of Minerals.

1 **Sulphur,** S, California.
2 **Molybdenite,** Mo S_2, Renfrew Co., Canada.
3 **Stibnite,** Gray Antimony, $Sb_2 S_3$, Sevier Co., Arkansas.
4 **Graphite,** Plumbago, C+, Colfax County, New Mexico.
5 **Gold.** Au, California.
6 **Silver,** (Argent), Ag, Zacatecas, Mexico.
7 **Cerargyrite** and Embolite, Silver City, New Mexico.
8 **Cinnabar,** Mercury Sulphide, Hg S_2, California.
9 **Copper,** Cuivre, Cu, (Lake Superior Region), Michigan.
10 **Chalcopyrite,** Copper Pyrites, Milan, N. Hampshire.
11 **Tetrahedrite,** Gray Copper, 4 CuS+$Sb_2 S_3$, Peru.
12 **Cuprite,** Red Copper, Copper Queen Mine, Arizona.
13 **Malachite,** Green CopperCarbonate, CopperQueen Ariz.
14 **Azurite,** Blue Copper Carbonate, Morenci, Arizona.
15 **Galenite,** Lead Ore, Pb S, Jasper County, Missouri.
16 **Wulfenite,** Lead Moiybdate, Yuma Co., Arizona.
17 **Pyromorphite,** Lead Phosphate, Phœnixville, Penna.
18 **Cerussite,** White Lead Ore, Pb O $C O_2$, Yuma Co., Ariz.
19 **Sphalerite,** Zinc Blende, Zn S, Jasper County, Mo.
20 **Zincite,** Red Zinc Ore, Zinc Oxide, Zn O, Franklin, N.J.
21 **Willemite,** Troostite, 2 Zn O+Si O_2, Franklin, N. J.
22 **Calamine,** Hydrous Zinc Silicate, Friedensville, Pa.
23 **Cassiterite,** Stream Tin, Sn O_2, Jalisco, Mexico.
24 **Rutile,** Nigrin, Ti O_2, Magnet Cove, Arkansas.
25 **Pyrite,** Fools Gold, Fe S_2, Milan, New Hampshire.
26 **Pyrrhotite,** Magnetic Pyrites, Gap Mine, Penna.
27 **Arsenopyrite,** Mispickel, Fe As S, Braintree, Vermont.
28 **Hematite,** Specular Iron Ore, Marquette Co., Mich.
29 **Magnetite,** Lodestone, Fe $Fe_2 O_4$, Magnet Cove, Ark.
30 **Franklinite,** (Fe Zn Mn) (Fe_2 Mn_2) O_4, Franklin, N. J.
31 **Chromite,** Chromic iron, Fe (Fe Cr) O_4, Texas, Penna.
32 **Limonite,** Brown Hematite, Negaunee, Michigan.
33 **Columbite,** Niobite, Fe O_3 Nb_2, Chesterfield, Mass.
34 **Vivianite,** 3 Fe O, $P_2 O_5$+8 aq, Mullica Hill, New Jersey.
35 **Siderite,** Spathic Iron, Fe O CO_2, Roxbury, Conn.
36 **Psilomelane,** Hard Manganese, Mn O_2+H_2 O etc., Ga.
37 **Corundum,** $Al_2 O_3$, Laurens C. H., South Carolina.
38 **Spinel,** Mg O $Al_2 O_3$, Sussex County, New Jersey.
39 **Cryolite,** Ice Stone, 3 Na F + $Al_2 F_3$, Ivigtuk, Greenl'd.
40 **Alunite,** Alum Stone, Muzai, Hungary.
41 **Turquois,** $Al_2 O_3 P_2 O_5$+5 H_2 O, Los Cerillos, N. Mex.
42 **Wavellite,** 3 $Al_2 O_3$ 2 $P_2 O_5$+12 aq, Montgomery Co. Ark.
43 **Magnesite,** Mg O Co_2, Texas, Lancaster Co., Penna.
44 **Fluorite,** Fluor spar, Ca F_2, Rosiclare, Illinois.
45 **Gypsum,** Plaster, Ca OSO_3+2 aq, Grand Rapids, Mich.
46 **Anhydrite,** Cubic spar, Ca O SO_3, New Brunswick.
47 **Apatite,** Renfrew Co., Ontario, Canada.
48 **Calcite,** Lime spar, Ca O CO_2, Guanajuato, Mexico.
49 **Marble,** Ca O CO_2, Vermont.
50 **Aragonite,** Flos Ferri, Ca O C O_2, Organ Mts., N. Mex.
51 **Dolomite,** (½ Ca ½ Mg) O C O_2, Jasper Co., Missouri.
52 **Barite,** Heavy spar, Ba O SO_3, Cheshire, Connecticut.
53 **Celestite,** Sr O SO_3, Strontian Island, Lake Erie.
54 **Halite,** Common Salt, Na Cl, Bermudas.
55 **Nitratine,** Soda Nitre, Na_2 O N_2 O_5, Peru.
56 **Quartz,** Rock Crystal, Si O_2, Hot Springs, Arkansas.
57 " Milky, Philadelphia, Pennsylvania.
58 " Smoky, Cairngorm Stone, Pike's Peak, Col.
59 " Chalcedony, Yellowstone National Park.
60 " Agate, Agate Harbor, Lake Superior.
61 " Chert, Jasper County, Missouri.
62 " Jasper, near Ottawa, Canada.
63 **Opal,** Si O_2+aq Queretaro, Mexico.
64 **Pyroxene,** Augite, Natural Bridge, Diana, Lewis Co. N.Y.
65 **Rhodonite,** Fowlerite, Mn O Si O_2, Franklin, N. J.
66 **Spodumene,** Chesterfield, Massachusetts.
67 **Amphibole,** Hornblende, Renfrew Co., Ontario, Can.
68 **Amphibole,** Actinolite, Delaware County, Penna.
69 **Beryl,** Be_2 Al_6 O_{18} Si_6, Ackworth, New Hampshire.
70 **Chrysolite,** Olivine 2(Mg Fe) O, Si O_2, Jackson Co., N.C.
71 **Garnet,** Stickeen River, Alaska.
72 **Zircon,** 2 Zr O Si O_2, Renfrew Co., Ontario, Canada.
73 **Vesuvianite,** Idocrase, Woodstock, Maine.
74 **Epidote,** Ca Fe Al_2 O_3 Silicate, Putnam County, N. Y.
75 **Zoisite,** Lime Epidote, Conway, Mass.
76 **Muscovite,** Common Mica, Jackson County, N. C.
77 **Biotite,** Black Mica, Essex County, New York.
78 **Wernerite,** Scapolite, Bolton, Massachusetts.
79 **Labradorite,** Mt. Marcy, Essex County, New York.
80 **Albite,** Soda Feldspar, Chesterfield, Mass.
81 **Microcline,** Amazon Stone, Pike's Peak, Colorado.
82 **Orthoclase,** Common Felspar, Black Hawk, Colorado.
83 **Tourmaline,** Schorl, Pierrepont, New York.
84 **Andalusite,** Chiastolite, Al_2 O_3 Si O_5, Lancaster, Mass.
85 **Cyanite,** False Sapphire, Al_2 O_3 Si O_2, Norwich, Conn.
86 **Topaz,** Al_2 Si O_5, Trumbull, Connecticut.
87 **Datolite,** H_2 Ca_2 B_2 O_{11} Si_2, Bergen Hill, New Jersey.
88 **Titanite,** Sphene, Renfrew Co., Ontario, Canada.
89 **Staurolite,** Fannin County, Georgia.
90 **Apophyllite,** Pyramidal Zeolite, Bergen Hill, N. J.
91 **Natrolite,** Needle Zeolite, Bergen Hill, New Jersey.
92 **Chabazite,** Cube Zeolite, Nova Scotia.
93 **Stilbite,** Radiated Zeolite, Frankford, Pennsylvania.
94 **Talc,** Steatite Soapstone Quarries, Montgomery Co. Pa.
95 **Glauconite,** Green Sand, Mullica Hill, New Jersey.
96 **Serpentine,** [illegible], Texas, Lancaster Co., Pa.
97 **Kaolinite,** Dixon's Quarry, Delaware.
98 **Ripidolite,** Chlorite, Clinochlore, Chester Co., Pa.
99 **Asphaltum,** (Hydrocarbon), Cuba, W. I.
100 **Anthracite** (mainly Carbon), Lehigh County, Pa.
101 **Orpiment,** Auripigment, Felsobanya, Hungary.
102 **Tetradymite,** $Bi^2(Te,S)^3$, Zsubko, Hungary.
103 **Argentite,** Ag_2 S, Silver Glance, Real del Monte, Mex.
104 **Pyrargyrite,** Ruby Silver, Guanajuato, Mexico.
105 **Platinum,** Pt, Pt. O ford, California.
106 **Chalcocite,** Copper Glance, Cu_2 S, Cheshire, Conn.
107 **Bornite,** Erubescite, Cu_3 Fe S_3, Calico District, N. M.
108 **Chrysocolla,** Cu O_3 Si+2 aq., Morenci, Arizona.
109 **Vanadinite,** 3 Pb O, VO_3+½ Pb Cl, Yuma Co., Ariz.
110 **Sphalerite,** Black Jack, Zn S, Cumberland, Eng.
111 **Sphalerite,** Ruby Blende, Zn S, Jasper County, Mo.
112 **Smithsonite,** Dry Bone, Zn O CO_2, Friedensville, Pa.
113 **Stannite,** Tin Pyrites, Cornwall, Eng.
114 **Brookite,** Arkansite, Ti O_2, Magnet Cove, Ark.
115 **Perofskite,** Ca O Ti O_2, Magnet Cove, Ark.
116 **Genthite,** Si O_2 Ni O Mg O, Webster, Jackson Co., N. C.
117 **Torbernite,** Uranite, Cornwall, England.
118 **Pyrite,** (Cubic Form), Fe S_2, Schuylkill Valley, Pa.
119 **Pyrite,** (Pyritoid Form), Fe S_2, Black Hawk, Colo.
120 **Marcasite,** White Iron Pyrites, Fe S_2, Jasper Co., Mo.
121 **Hematite,** (Crystals), Fe_2 O_3, Antwerp, New York.
122 **Hematite,** Red Ochre, Fe_2 O_3, Clinton, New York.
123 **Martite,** Fe_2 O_3, in Prochlorite, Cleveland Mine, Mich.
124 **Menaccanite,** Ilmenite, (Ti Fe) $_2$ O_3, Rhode Island.
125 **Magnetite,** Fe_2 O_3 Fe O_3 (Crystals), Harford Co., Md.
126 **Limonite,** Pseudomorph after pyrite, Apishpa, Colo.
127 **Limonite,** Brown Ochre, Fe_2 O_3 3 H_2 O, Chester Co. Pa.
128 **Gothite,** Wood Ore Fe_2 O_3 H_2 O, Superior Mine. Mich.
129 **Copiapite,** Iron Alum, Atacama, Chile.
130 **Wolframite,** (Fe Mn) O W O_3, Cornwall, Eng.
131 **Pyrolusite,** Mn O_2, Nova Scotia.
132 **Wad,** Copper Queen Mine, Cochise County, Arizona.
133 **Triplite,** Peru, Maine.
134 **Rhodochrosite,** Mn O CO_2, Kapnik, Hungary.
135 **Corundum,** Emery, Asia Minor.
136 **Gahnite,** Variety Dysluite, Sterling Hill, N. J.
137 **Amblygonite,** Hebron, Maine.
138 **Lazulite,** Blue spar, Graves Mt., Georgia.
139 **Variscite,** Al_2 O_3 P_2 O_5+aq., Montgomery Co., Ark.
140 **Samarskite** (new Elements), Mitchell County, N. C.
141 **Allanite,** Orthite, Amherst County, Virginia.
142 **Fluorite,** Green Fluor Spar, Ca F_2, Durham, Eng.
143 **Gypsum,** Selenite, Ca OSO_3+2 aq., Indian Territory.
144 **Gypsum** (fibrous), Owasco, Cayuga Co., New York.
145 **Ulexite,** Hants County, Nova Scotia.
146 **Colemanite,** San Bernardino Co., California.
147 **Calcite,** Nailhead Spar, Ca OCO_2, Cumberland, Eng.
148 " Cleavage rhombohedron, St. Lawrence Co. N.Y.
149 " Stalagmite, Mammoth Cave, Kentucky.
150 " Chalk, Dover Cliffs, England.
151 " Calcarious Tufa, Petrified Moss, Oswego Co. N.Y.
152 " Limestone, Oolitic, Humbolt, Iowa.
153 **Dolomite,** Marble, Westchester Co., N. Y.
154 **Barite** (Stinkstone), Ba OSO_3+CH, Berks Co., Pa.
155 **Witherite,** BaO CO_2, Alston Moor, England.
156 **Barytocalcite,** Ba OCO_2 Ca OCO_2, Alston Moor, Eng.
157 **Strontianite,** Sr O CO_2, Hamm, Westphalia.
158 **Thenardite,** Borax Lake, San Bernardino Co., Cal.
159 **Quartz,** Amethyst, Si O_2, Guanajuato, Mexico.
160 " Rose-colored, Black Hills, Dakota.
161 " Moss Agate, Deadwood, Dakota.
162 " Pseudo. after Crocidolite, Tiger Eye, S. Africa.
163 " Honestone (Hornstone), Hot Springs, Ark.
164 " Flint, Dover Cliffs, England.
165 " Petrified Wood, Bijou Basin, Colo.
166 **Fire Opal,** Si O_2+aq., Queretaro, Mexico.
167 **Opal,** Infusorial Earth, or Tripoli, Richmond, Va.
168 **Tridymite,** Si O_2, San Christobal, Hidalgo, Mexico.
169 **Enstatite,** Bronzite, Webster, North Carolina.
170 **Woliastonite,** Tabular Spar, Diana, Lewis Co., N. Y.
171 **Pyroxene,** Coccolite, Oxbow, Jefferson Co., N. Y.
172 **Amphibole,** Tremolite, Governeur, New York.
173 **Amphibole,** Asbestus, Delaware County, Pa.
174 **Crocidolite,** Griqua Land, South Africa.
175 **Garnet,** Crystal, dodecahedral, Southbury, Conn.
176 " Melanite, Franklin, New Jersey.
177 **Iolite,** Chlorophyllite, Belmont, New Hampshire.
178 **Phlogopite,** Burgess, Canada.
179 **Lepidolite,** Lithia Mica, Norway, Maine.
180 **Nephelite,** Elaeolite, Magnet Cove, Arkansas.
181 **Sodalite,** Ditro, Hungary.
182 **Leucite** (Amphigenyte), Vesuvius, Italy.

A. E. FOOTE'S Collection of Minerals.

183 **Orthoclase** (Cleavage), Delaware Co., Pennsylvania.
184 **Tourmaline,** Brown, Hamburg, New Jersey.
185 **Fibrolite,** Brandywine Springs, New Castle Co., Del.
186 **Staurolite,** (twin,) Fannin Co., Georgia.
187 **Pectolite,** Bergen Hill, New Jersey.
188 **Talc,** Foliated, Harford Co., Maryland.
189 " Rensselaerite, St. Lawrence Co., New York.
190 **Pyrophyllite,** Graves Mt., Georgia.
191 **Serpentine,** Williamsite, Texas, Lancaster Co., Pa.
192 **Deweylite,** Jackson County, North Carolina.
193 **Vermiculite,** Lenni, Delaware Co., Pennsylvania.
194 **Protovermiculite,** Magnet Cove, Arkansas.
195 **Chloritoid,** Masonite, Natic, Rhode Island.
196 **Ozocerite,** Native Paraffin, Boryslaw, Gallacia.
197 **Elaterite,** Elastic Bitumen, Derbyshire, England.
198 **Copalite,** Retinite, C 85.5 H 11.5 O 3%, Zanzibar, Africa.
199 **Bituminous Coal,** Evansville, Indiana.
200 **Cannel Coal** C. West Virginia.

The preceding collection includes in the first 100 every species in the list advised in Dana's Manual, and some species like Wulfenite, Vivianite, Nitratine, Labradorite, Datolite, Titanite, and Cerargyrite that are especially advised by Brush, Nason, Egleston, and other writers on Mineralogy and Blowpipe Analysis; also, other species like Turquoise, Azurite, Microcline, and Wavellite that are important and beautiful. It illustrates the principal species and grand subdivisions of minerals, the more important ores, and by the selection of a few from the second hundred, contains minerals in which all the elements have been found. It is the cheapest and best collection ever put up, being an improvement on the one of which we have put up so many thousands in the last few years. It is well fitted for illustrating Chemical Lectures, Physical Geography, etc. The second 100 includes all the remaining varieties mentioned in Dana's list, and minerals illustrating the rarer elements. The third hundred includes still more rare and mostly less important species and varieties as per the following list. Customers can make their own selections from the 300, or from our price list, but the prices will be somewhat higher than if our regular collections are taken. This is due to the fact that the work of putting the collections up, labelling, and packing, is thoroughly systematized.

For blowpipe purposes we substitute 10 species, for the varieties of Silica, etc. in the first 100, at an expense of 15% additional, and about 50 species for varieties in the second 100 at an expense of 50% additional, as many of these are much more rare.

Aegirite, Albertite, Allemontite, Analcite, Antimony, Asenic, Astrophyllite, Atacamite, Automolite, Autunite, Baltimorite, Basanite, Bismuthinite, Borax, Bournonite, Braunite, Bromlite, Brucite, Cancrinite Cassiterite, Chalcophanite, Chalcophyllite, Chalcosiderite, Chlorastrolite, Chondrodite, Chrysotile, Citrine, Copiapite, Danburite, Descloizite, Diabantite, Dufrenite, Dumortierite, Erythrite, Essonite, Flexible Sandstone, Gadolinite, Greenockite, Hagemannite, Hanksite, Haydenite, Herrengrundite, Helitrope, Heulaudite, Hyacinth, Hydrodolomite, Hydrous Anthrophyllite, Hypersthene, Indicolite, Jamsonite, Jeffersonite, Langite, Lebethenite, Loxoclase, Ludwigite, Manganite, Millerite, Mimetite, Oligoclase, Olivenite, Paracolumbite, Petroleum, Pharmacosiderite, Phenacite, Proustite, Rubellite, Sassolite, Schorlomite, Smaltite, Sylvanite, Thompsonite, Tyrolite, Uintahite Uranotil, Zaratite, and 25 others are included in our third hundred.

3.—Antimony Glance, Antimonite, Stibine, Spiessglas, Stimmi.

4.—Black lead, carburet of iron, mica pictoria nigra, mica des peintress, crayon, reissbley, fer carbure.

7.—Kerargyrite, Horn Silver, Buttermilcherz, Argyroceratite, Chlorobromide of Silver.

12.—Octahedral Copper Ore, Oxydulated Copper, Ruterite.

13.—False emerald, molochites, berggrun, mountain green, Atlaserz.

14.—Chessy copper or lazurite, azure copper ore.

15.—Galena, targionite, Steinmannite, Johnstonite, plumbeine, Fournetite.

16.—Plomb molybdate, yellow lead spar.

17.—Green lead ore, brown lead ore, polysphaerite, Miesite, Nussierite, Cherokine.

18.—Carbonate of lead, Iglesiasite.

19–110–111.—Cleiophane, marmatite, Christophite, Przibramite, marasmolite, Rahtite.

20.—Red Oxyd of Zinc, Sterlingite, ruby zinc, Spartalite.

21.—Siliceous Oxyd of Zinc, Williamsite.

22.—Wagite, electric calamine, hemimorphite.

23.—Wood tin, toads-eye tin, tin stone, tin ore.

24.—Sagenite, Crispite, Ilmeno-rutile, titanite, red schorl.

25–118–119.—Iron Pyrites, mundic eisenkies.

28–121–122.—Micaceous, reddle, red chalk, clay iron-stone, argillaceous hematite, jaspery clay-iron stone, lenticular iron ore, itabiryte, iron glance.

29–125—Magnesian, titaniferous, ochreous, magnetic.

31.—Chromoferrite, siderochrome.

32–126–127.—Bog-ore, brown clay iron-stone, pisolite, oolitic, yellow ochre.

33.—Uranotantalite, uranoniobite, yttroilmenite.

34.—Eisenblau, blue iron earth, Fer azure, Eisenglimer, Eisen-Phyllit, Glaukosiderit, Auglarite, Mullicite.

35.—Oligonite, siderodot, spherosiderite, sparry iron, brown spar, steel ore.

36.—Black Hematite, Compact black manganese ore.

37–135.—Sapphire, hyacinth, carbuncle, ruby or oriental ruby, oriental topaz, oriental emerald, oriental amethyst, asteriated sapphire, adamantine stone, Armenian stone.

38.—Spinel ruby, Balas ruby, Rubicella, Almandine ruby, Chloro-spinel, Picotite.

43.—Lamellar, Baudisserite, Breunerite, Walmstedtite.

44–142.—Ratoftite, chlorophane, antozonite, blue John, Derbyshire spar.

45–143–144.—Satinspar, alabaster, Montmartite.

46.—Anhydrous, Calcium Sulphate, Tripe Stone, Vulpinite.

47.—Asparagus stone, moroxite, lazurapatite, Francolite, phosphorite, eupyrchroite, osteolite, fluor-apatite, chlorapatite, pseudoapatite.

48–49–147 to 152.—Calc spar, Iceland spar, doubly refracting spar, rhomb spar, preunnerite, natrocalcite, Reichite, dolomitic, ferrocalcite, manganocalcite, plumbocalcite, neotype, Spartaite, calcimangite, strontianocalcite, Fontainebleu limestone, Hislopite, satin-spar, argentine, aphrite, granular limestone, saccharoidal limestone, marbles (statuary, Parian, Carrara, sienna, cipolin, verde-antique, architectural, shell, madreporic, encrinal, lumachelle, ruin, landscape, lithographic, breccia), hydraulic limestone, calcarious marl, pisolite, stalactite, alabaster, Gibraltar stone, calc sinter, travertine, inolite, agaric, stink-stone, lucellite, hematoconite, sideroconite, anthraconite, swine stone, rock milk, rock meal, calcarious spar.

50.—Coralloidal, Stalactitic, Satin Spar, Arragon Spar, Iglite, Nadelstein, Chimborazite, Tarnovizit, Mossottite.

51–153.—Miemite, Gurhofite, architectural, saccharoid. porcellanous, ferriferous, brown spar, Brossite, Tharandite, manganiferous, cobaltiferous, conite, bitter spar, rhomb spar, pearl spar.

52–154.—Bolognastone, allomorphite, calcareobarite, cawk, baretine.

53—Calciocelestite, barytocelestite.

55 to 62–159 to 165.—Star, asteriated, false topaz, citrine, greasy, siderite, sapphire, sageniticc, catseye, aventurine, chloritic, actinolitic, micaceous, arenaceous, agatized wood, green, Berlin, flint, Carnelian, bloodstone, heliotrope, chrysoprase prase, plasma, nicolai, onyx, sardonyx, mochastone, hornstone, basanite, Lydian stone or touchstone, Egyptian Jasper, porcelain Jasper, quartzite, conglomerate, sandstone, tabular, Haytorite, Beckite, Babel, silicified shells.

63–166–167.—Precious, girasol, common, resin, wax, semi-hydrophane, Forcherite, cacholong, agate, menaillite, hyalite, Muller's glass, fiorite, silicious sinter, Michaelite, geyserite, tripolite, Randanite, tripoli slate, alum-ocalcite, jasp-opal, wood-opal, glas-opal, pearl sinter.

64–171.—Malacolite, Alalite, Mussite, Travasellite, Sahlite, Baikalite, protheite, Funkite, diallage, hypersthene, bronzite, Hedenbergite, Lotalite, Schefferite, Richterite, Jeffersonite, leucaugite, Fassaite, aregite, Hudsonite, polylite, Breislakite, Lavroffite, hydrous, picrophyll, Pyrallolite, Schiller spar, Pitkarandite, Strakonizite, Monrodite, hydrous diallage.

65.—Bustamite, Marceline, heteroclin, dyssnite, Allagite Photicite, horn-manganese.

67–68–172–173.—Grammatite, Nordenschioldite, raphilite, nephrite, jade, kidney stone, calamite, sebesite, antholite, Richterite, Cummingtonite, Dannemorite, asbeferrite, Grunerite, mountain leather, mountain paper, mountain cork, mountain wood, amianthus, byssolite, Edenite, Smaragdite, green diallage, Pargasite, diastatite, Syntagmetite, Wallerian, Noralite, Gamsigradite, hydrous anthophyllite.

69.—Emerald, aquamarine, hyacinthozontes, amethiste basaltine, chrysoberylius, chryoprasius, chrysolithus, Davidsonite, Goshenite.

70.—Precious, Common, Glinkite Hyalosiderite, Peridot.

71–176.—Grossularite, cinnamon-stone, essonite, hyacinth, succinite, romanzovite, pyrope, Bohemian garnet, carbuncle, almandite, precious or oriental garnet, Spessartite, Andradite, allochroite, topazolite, colophonite, Pyreneite, Jelletite, Calderite, polyadelphite, Rothoffite, aplome, ytter-garnet, Bredbergite, Ouvarovite.

A. E. Foote's Collection of Minerals.

72.—Hyacinth, Engelhardite, calyptolite, jargoon, jacinth, topazius.
73.—Heteromerite, Xanthite, Cyprine.
74.—Scorza, Arendalite, thallite, Delphinite, Oisanite, Puschkinite, Achmatite, Escherite, Bucklandite, Bagrationite, Withamite, pistacite.
75.—Unionite, Thulite, Saussurite.
76.—(Mica—potash, biaxial, oblique,) Glimmer, phengite, nacrite, Fuchsite, Adamsite.
78.—Nuttallite, Chelmsfordite, glaucolite, rapidolith, paranthine, Fuchsite, atheriastite, stroganovite, Algerite, Wilsonite, terenite, pinitartigen, talkartiger, gabbronite.
79.—Saussurite, Radauite, silicite, mornite, Labradorstein, lime feldspar, Labrador Feldspar, chatoyant, opaline.
80.—Aventurine feldspar, moonstone, peristerite, pericline, hyposclerite, Cleavlandite, olafit, felsite, petrosilex, Adinole, oligoklis-albit, helleflinta, feldspath, tetartin, periklin.
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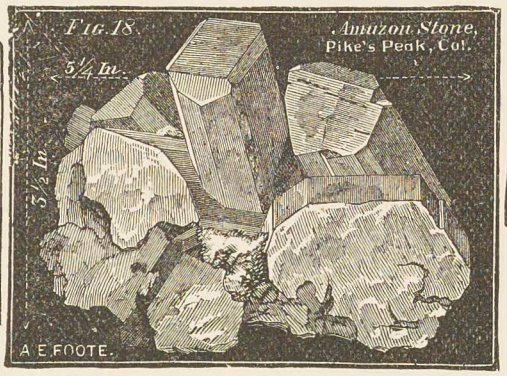

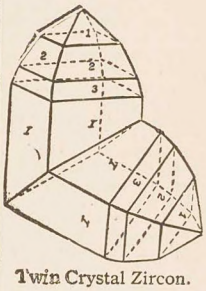

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118 " Silver Ore 96..50c. to 10 00
Arseniopleite A. J. S. 35–416
570 Arseniosiderite 584....50c. to 2 50
570 Arsenocrocite 584.....50c. to 2 50
219 Arsenolite 183.....50c. to 1 00
94 Arsenopyrite 78.....10c. to 2 00
33 A. Arsenotellurite Ap. 2–5...
Arsenstibite Ap. 2–5.....
247 Asbeferrite 234.....50c. to 1 00
247 Asbestus 234, 216.....5c. to 1 50
218 Asbolan, Asbolite 1812.5c. to 1 00
231 B. Asmanite Ap. 2–5.....
492 Asparagus-stone 530...50c. to 1 00
426 Aspasiolite 485.....25c. to 1 00
830 Asphaltum 751.....5c. to 50
329 Aspidelite 383.....50c. to 1 00
288 Aspidolite Ap. 1–2.....
315 Asteriated Feldspar...25c. to 1 00
231 " Quartz 193...75c. to 5 00
179 " Sapphire 138..50c. to 10 00
238 Asteroite Ap. 1–2.....
659 Astracanite 643 .....50c. to 1 00
292 Astrophyllite 308.....25c. to 1 50
153 Atacamite 121.....15c. to 2 00
337 Atelestite 392.....1 00 to 3 00
299 Atheriastite 323.....50c. to 1 00
752 A. Atlasite 716.....50c. to 2 50
Atopite Ap. 3–10.....
561 Attacolite 580.....
272 E. Auerbachite 276..... 1 00
Auerlite, A. J. S. 36–461.....
562 Augelite 580.....
238 Augite 216.....5c. to 5 00
750 Aurichalcite 712.....25c. to 1 50
75 Auriferous Pyrite 63...10c to 1 00
" Quartz 6..10c. to 5 00
27 Auripigmentum 27.....5c. to 5 00
98 Aurotellurite 81.....50c. to 5 00

185 Automolite 149.....5c. to 5 00
573 Autunite 586.....5c. to 1 50
231 AventurineQuartz 193.50c. to 2 00
316 " Feldspar 355....10c. to 2 00
311 " Labradorite 341..25c.to 2 00
314 " Oligoclase 347....25c.to 2 00
285 Axinite 297.....25c. to 3 00
832 Azorite 761..... 1 00
551 Azurespar or stone 572..5c.to 3 50
752 Azurite 715.....5c. to 10 00
242 Babingtonite 227.....50c. to 1 50
278 Bagrationite 285.....50c. to 1 00
238 Baikalite 215.....50c. to 1 00
820 Baikerinite 747.....
75 Ballesterosite 63.....25c. to 1 00
411 Baltimorite 467.....10c. to 1 00
323 Bamlite 373..... .....50c. to 1 00
Barcenite Ap. 3–11..... 1 50
Barettite Ap. 1–3.....
630 Barite 616.....5c. to 10 00
79 Barnhardtite 67..... 1 00
552 Barrandite 574..... 1 50
310 B. Barsowite 340..... 75
687 A. Bartholomite Ap. 2–6.....
Barylite Ap. 3–12.....
Barysil A. J. S. 35–417.....
630 Baryt 616.....5c. to 10 00
730 Barytocalcite 701... .....5c. to 3 00
311 Basalt 343..... .....5c. to 1 50
231 Basanite 195.....10c. to 1 00
412 Bastite 460.....15c. to 1 00
732 A. Bastnästite Ap. 1–2..... 2 50
803 Bathvillite 742 .....
258 Batrachite 256.....15c. to 1 50
439 Bavalite 796.....
539 Bayldonite 565..... 1 00
334 Beaumontite 444.....25c. to 2 50
208 Beauxite 174.....5c. to 50
600 Bechilite 597..... ..50c. to 1 50
231 Beekite 196.....10c. to 1 50
Beegerite Ap. 3–13.....
Belonesite A. J. S. 35–417.....
Bementite A.J.S.35–417.15c.to 5 00
788 Benzole 737.....
524 Beraunite 558... .....10c. to 50
830 D. Berengelite 753.....50c. to 1 00
359 Bergholz 403..... . .... 25c. to 75
378 Bergmannite 427.....25c. to 1 50
420 Bergseife 476.....10c. to 50
549 Berlinite 571.....
104 Berthierite 86.....25c. to 1 00
Bertrandite Sm. '82..2 50 to 10 00
254 Beryl 245 .....5c. to 10 00
254 Beryl 245 precious.....50c. to 10 00
Beryllionite A. J. S. 37–31...
50 Berzelianite 46.....
501 Berzeliite 544.....50c. to 2 50
767 to 771 Beta Naptha Group 720
582 Beudantite 583.....50c. to 2 00
276 Beustite 282.....50c. to 2 00
66 A. Beyrichite Ap. 1–3..50c. to 3 50
667 Bieberite 647.....50c. to 1 00
424 Biharite 483.....25c. to 1 00
586 Bindheimite 591.....25c. to 2 00
110 Binnite 90..... 1 50
289 Biotite 304..... .....5c. to 1 50
222 Bismite 185.....25c. to 1 50
20 Bismuth 19.....25c. to 5 00
336 " Blende 391..25c. to 1 00
222 " Ochre 185...25c. to 2 50
31 " Telluric 30..... 1 00
Bismuthaurite 795.....
30 Bismuthinite 30.....10c. to 5 00
36 Bismuth Silver 36.....1 00 to 10 00
753 Bismutite 716..... .....50c. to 2 00
716 Bitter Spar 682.....10c. to 1 00
830 Bitumen 751.....5c. to 50
782 Bitumen, Elastic 734...5c. to 50
831 Bituminous coal 754....5c. to 1 00
56 Black Jack 48.....5c. to 5 00
183 Black Spinel 147.....5c. to 5 00
676 Blakeite 652.....
586 Bleinierite 591.....25c. to 2 00
269 Black Garnet 268.....5c. to 2 00
25 Black Lead 24.. .....5c. to 2 00
56 Blende 48.....5c. to 5 00
115 " Fire 93.....5 00 to 15 00
56 " Ruby 48.....5c. to 5 00
659 Blödite 643.....25c. to 2 00
Blomstrandite Ap. 3–16.....
231 Blood Stone 194.....10c. to 1 50

551 Blue Feldspar 572.....5c. to 2 50
524 " Iron Earth 556...5c. to 2 50
159 " John 123.....5c. to 5 00
669 " Vitriol 648.....25c. to 1 00
24 Boart (Diamond) 21..1 00 to 10 00
523 A. Bobierrite 795.....
279 A. Bodenite 289..... 50
206 Bog Iron Ore 172.....5c. to 25
420 Bole 476.....25c. to 50
135 Bolivianite 109.....
630 Bolognian Stone 616...25c. to 1 00
257 Boltonite 255.....25c. to 1 00
805 A. Bombiccite Ap.2–8..50c. to 1 50
426 Bonsdorffite 485.....50c. to 1 00
597 Boracite 595.....25c. to 2 50
599 Borax 597.....10c. to 2 00
144 A. Bordosite Ap. 2–8.....
576 Borickite 588..... 50
49 Bornite 44.....10c. to 5 00
602 Boronatrocalcite 598..25c. to 1 00
680 Bosjemanite 654..... 75
687 Botryogen 657.....25c. to 1 00
327 Botryolite 380.....25c. to 1 00
122 Boulangerite 99.....25c. to 2 00
119 Bournonite 96.....10c. to 5 00
651 Boussingaultite 635.....
411 Bowenite 465.....25c. to 50
Brackebuschite Sm.'82..75c.to 1 50
272 F. Bragite 276..... 1 50
785 Branchite 736.....50c. to 2 50
461 Brandisite 508.....15c. to 1 00
196 Braunite 163.....25c. to 1 25
Bravaisite Ap. 3–18.....
715 Breccia Marble 679....10c. to 1 00
269 Bredbergite 270.....50c. to 1 50
238 Breislakite 216.....25c. to 1 00
72 Breithauptite 61.....50c. to 2 00
718 Breunnerite 686.....10c. to 50
378 Brevicite 426.....50c. to 1 00
395 Brewsterite 445.....25c. to 2 00
833 Brewsterlinite 761.....
701 Brochantite 664.....50c. to 5 00
Bröggerite Sm. '84.....
727 Bromlite 698.....10c. to 3 00
142 Bromyrite 116.....1 00 to 5 00
111 Brongniardite 90..... 2 00
234 Bronzite 209.....5c. to 1 50
198 Brookite 164.....5c. to 10 00
716 Brossite 682.....25c. to 1 00
716 Brown Spar 682.....5c. to 50
210 Brucite 175.....10c. to 10 00
823 Brücknerellite 748.....
518 Brushite 552.....
801 Bucaramangite 741.....
323 Bucholzite 374.....5c. to 25
Buckingite A. J. S. 36–156...
278 Bucklandite 285.....50c. to 1 00
231 Buhrstone 196.....10c. to 25
174 Bunsenite 134.....50c. to 2 00
750 Buratite 712.....10c. to 1 50
241 Bustamite 225 .....10c. to 1 50
Bustamentite Ag. 1, Ap. 2–9
821 Butyrellite 747.....
830 F. Byerite Ap.2–9.....50c. to 1 00
247 Byssolite 234.....5c. to 1 00
310 C. Bytownite 340..... 50
529 Cabrerite 561..... 1 50
Cacoclasite. This Cat..10c. to 2 50
232 Cacholong 199.....10c. to 50
569 Cacoxenite 584.....10c. to 1 50
69 Cadmium Blende 59...10c. to 5 00
231 Cairngorm Stone 193...5c. to 10 00
361 Calamine 407.....5c. to 5 00
361 " Green 497...25c. to 3 00
247 Calamite 233.....50c. to 1 00
98 A. Calaverite 795..... 2 00
715 Calcareous Spar 670.....5c. to 5 00
715 " Tufa 680.....5c. to 1 00
231 Calcedoine 194.....5c. to 1 00
557 Calcioferrite 578.....
715 Calcite 670.....5c. to 5 00
Calcozincite Ap.3–20..10c. to 1 50
636 Caledonite 625.....1 50 to 5 00
550 Callainite 572.....
568 Callais, Callaite 580.....5c. to 5 00
136 Calomel 111..... 1 00
494 Campylite 537.....25c. to 2 50
238 Canaanite 220.....10c. to 50
304 A. Cancrinite 329.....25c. to 1 00
831 Cannel Coal 755.....10c. to 50
782 Caoutchouc Mineral 734..5c. to 50

Cappelenite Sm. '85.....
66 Capillary Pyrites 56...25c. to 1
172 " RedOxydCopper133.10c to
343 Caporcianite 399.....
231 Capped Quartz 189.....25c. to 1
24 Carbonado 22.....
269 Carbuncle 265.....25c. to 1
502 Carminite 545.....
147 Carnallite 118.....25c. to 1
231 Carnelian 194.....10c. to 1
374 A. Carolathine 420.....50c. to 1
373 Carpholite 419.....50c. to 1
692 Carphosiderite 661.....
715 Carrara Marble 689...15c. to 1
82 Carrollite 69.....
Caryinite Ap. 3–20.....
192 Cassiterite 157.....5c. to 1
316 Cassinite 356.....25c. to 1
330 Castellite 386.....75c. to 1
51 Castillite 46.....
244 Castor 229.....2 00 to 1
344 Catapleiite 401.....
423 Cataspilite 483.....
Catlinite 796.....10c. to 1
231 Cat's-eye Quartz 193..25c. to 2
179 " Corundum...1 00 to 5
630 Cawk 616.....10c. to 1
410 Celadonite 463.....
90 Cellular Pyrites 75.....15c. to 1
631 Celestite 619.....5c. to 1
341 A. Centrallassite 796.....
140 Cerargyrite 114.....10c. to 1
151 Cerasine 120.....
367 Cerite 413.....10c. to 1
414 Cerolite 470.....10c. to 1
729 Cerussite 700.....10c. to 1
227 Cervantite 187.....25c. to 1
183 Ceylanite 147.....25c. to 1
386 Chabazite 434.....5c. to 1
669 Chalcanthite 648..... 25c. to 1
231 Chalcedony 194.....5c. to 2
563 Chalchihuitl 293.....5c. to 1
61 Chalcocite 52.....5c. to 1
407 Chalcodite 460.....5c. to 1
572 Chalcolite 585.....5c. to 1
Chalcomenite Ap. 3–23.....
Chalcomiclite Ap. 2–11.....
370 A. Chalcomorphite Ap. 2–11
Chalcophanite Ap.3–23..5c.to 1
548 Chalcophyllite 571..... 5c. to 1
78 Chalcopyrite 65.....5c. to 1
68 A. Chalcopyrrhotite Ap.2–11
568 Chalcosiderite 583.....10c.to 1
101 Chalcostibite 85.....
172 Chalcotrichite 133.....10c. to 1
715 Chalk 679.....5c. to 1
721 Chalybite 688.....5c. to 1
469 Chamoisite 511.....
83 Chathamite 70.....
299 Chelmsfordite 320.....
567 Chenevixite 583.....
231 Chert 195.....5c. to 1
316 A. Chesterlite Ap.3–80.10c. to 1
752 Chessy Copper 715.....5c. to 1
322 Chiastolite 371.....5c. to 1
560 Childrenite 579.....10c. to 1
623 Chileite 612.....
36 Chilenite 36.....1 00 to 1
166 Chiolite 128.....
103 Chiviatite 86.....
183 Chloanthite 70.....25c. to 1
Chloralluminite Ap. 3–25...
364 Chlorastrolite 412.....5c. to 1
452 Chlorite 501.....5c. to 1
444 Chlorite-like Mineral 493...
458 Chloritoid 504.....5c. to 1
138 A. Chlorocalcite Ap. 2–11....
Chloromagnesite Ap. 3–25...
408 Chloropal 461.....25c. to 1
467 Chlorophaeite 510.....5c. to 1
159 Chlorophane 123.....10c to 1
409 Chlorophanerite 462.....
287 Chlorophyllite 301,485..5c. to 1
183 Chlorospinel 147.....
Chlorothionite Ap. 3–25.....
Chlorotile Ap. 3–26....50c. to 1
167 Chodneffite 128.....
532 Chondrarsenite 562.....
319 Chondrodite 363.....10c. to 1
446 Chonicrite 494.....
773 Chrismatite 728.....

Christianite 337, 438...50c. to 1 50
Chrome Ochre 510.....50c. to 1 00
Chromite Chrom.Iron 153..5c.to 50
Chrysoberyl 155.....25c. to 5 00
Chrysocolla 402.....10c. to 2 50
Chrysolite 255.....5c. to 1 00
Chrysolite Iron-manganese 259
Chrysoprase 194, 246...25c. to 3 50
Chrysotile 465.....10c. to 3 00
Churchite 555.....
Cimolite 457.....25c. to 75
Cinnabar 55.....10c. to 5 00
" hepatic 55...25c. to 50
Cinnamon Stone 266...5c. to 2 50
Cirrolite 579.....
Citrine.....15c. to 1 50
A. Claudetite 796.....
Clausthalite 42.....1 00 to 2 50
Clay 473.....5c. to 25
" Iron Stone 141.....5c. to 50
Clayite 108.....
Cleveite Ap. 3–27.....
Cleavelandite 350.....5c. to 25
Cliftonite A. J. S. 34–232.....
Clinochlore 497.....10c. to 2 50
Clinoclasite 570.....50c. to 5 00
Clinocrocite Ap. 3–28.....
Clinophaeite Ap. 3–28.....
Clintonite 508.....15c. to 1 00
Cluthalite 433.....50c. to 1 50
Coal, Mineral 753.....5c. to 50
A. Cobalt, Arsenical Ap. 1–1 1 00
Cobalt Bloom 558.....10c. to 2 50
" Earthy 181.....10c. to 1 00
" Glance 71.....25c. to 5 00
" Pyrites 68.....25c. to 2 00
" Tin White 70...25c. to 2 50
Cobaltite 71.....25c. to 5 00
Coboltomenite Sm. '82.....
Coccinite 117.....1 50
Cockscomb Pyrites 75..5c. to 5 00
Coccolite 215.....5c. to 50
C.Coerulcolactite Ap.1–3.5c.to 2 50
Colemanite Sm. '84.....5c. to 10 00
Collyrite 420.....10c. to 50
Colophonite 269.....5c. to 50
Coloradoite Ap. 3–29..35c. to 3 00
Columbite 515.....5c. to 5 00
Comptonite 424.....10c. to 1 50
Conarite 405.....
Condurrite 37, 797.....25c. to 3 00
Conichalcite 565.....10c. to 1 50
Conite 682.....50
Connellite 627.....1 50 to 5 00
Cookeite 489.....10c. to 1 00
Copal, Copalite 739.....5c. to 50
Copalite, insects in.....5c. to 50
Copiapite 655.....10c. to 1 50
Copper 14.....10c. to 5 00
" Arsenate 564...10c. to 3 50
" Arsenical 36...25c. to 3 00
" Blue 715.....5c. to 5 00
" Chloride 121...25c. to 1 50
" Glance 52.....10c. to 5 00
" Gray 101.....10c. to 5 00
" Green 713.....5c. to 5 00
" Mica 571.....25c. to 2 00
" Nickel 60.....25c. to 2 00
" Oxyd 133.....5c. to 5 00
" Phosphate 563..10c. to 1 50
" Purple 44.....15c. to 5 00
" Pyrites 65.....5c. to 5 00
" Red 133.....5c. to 5 00
" Silicate 402.....10c. to 3 50
" Sulphuret 75.....5c. to 5 00
" Vitreous 52.....5c. to 5 00
Copperas 646.....25 c. to 1 00
Copperasine 660.....50
B. Coprolites 534.....5c. to 25
Coquimbite 650.....5c. to 1 50
Cordierite 299.....50c. to 2 50
Cornish Diamond 189..25c. to 1 00
Cornwallite 569.....2 00
Coronguite Ap. 3–30.....
Corundophilite 504.....1 00
Corundum 137.....5c. to 5 00
Corynite 74.....50c. to 1 00
A. Cosalite 797.....1 50
Cossyrite Ap. 3–31.....
Cotton Stone 598.....10c. to 1 50
Cotunnite 117.....25c. to 1 00
Couzeranite 326.....50c. to 1 00
Covellite 83.....25c. to 1 50
Crednerite 1.6.....1 00
Crocidolite 242.....5c. to 2 00
Crocoite 629.....25c. to 5 00
Cronstedtite 503.....25c. to 5 00
Crookesite 40.....1 00
Cross Stone 371.....5c. to 2 50
Cryolite 126.....5c. to 5 00
Cryophyllite 316.....50
Cryphiolite A. J. S 35–417.....
Cryptolite 429.....1 00
Cryptolinite 762.....
Crytomorphite 599.....25c. to 1 00
Crystobalite A. J. S. 34–73...2 50
Cubanite 65.....10c. to 50
Cube ore 578.....15c. to 2 00
Cubizite 433.....25
Cuivre, *Vide* Copper.....
Culsageeite Ap. 2–30.....1 00
Cumengite 188.....1 25
Cummingtonite 225.....1 00
Cumole 737.....
Cuprite 133.....5c. to 5 00
Cuprocalcite Ap. 3–32.....
A.Cupromagnesite Ap. 2–14.
B.Cuproplumbite 42.....
Cuproscheelite 606.....2 00
A. Cuprotungstite Ap.2–14...
Cuspidine Ap. 3–33.....
Cyanite 375.....5c. to 2 00
A. Cyanochalcite Ap. 1–4.....
Cyanochroite 649.....
B. Cyanolite 797.....
Cyanosite 648.....1 00
Cyanotrichite 666.....1 50 to 3 00
A. Cyclopite 340.....
A. Cymatolite 455.....10c. to 2 00
Cymole 737.....
Cyprine 276.....25c. to 2 00
Cyprusite Ap. 3–33.....
B. Cyrtolite 275.....75
Dahllite A.J.S. 37–77.....
Daleminzite 51.....
Damourite 487.....15c. to 50
Danaite 78.....50c. to 1 00
Danalite 265.....25c. to 1 00
Danburite 299.....5c. to 2 50
Dark-red Silver 94.....25c. to 10 00
Darwinite 37.....5 00
Datolite 380.....5c. to 5 00
Daubreelite Ap. 3–34.....
Daubreite Ap. 3–35.....
Davreuxite Ap. 3–35.....
Davyne 327.....50c. to 2 00
Dawsonite Ap. 2–16....20c. to 2 00
Decatritylene 729.....
Decatylene 729.....
Dechenite 609.....1 00
Degeroite 489.....1 25
A. Delafossite Ap. 2–16.....
Delawarite 356.....15c. to 50
Delessite 497.....10c. to 75
Delvauxite 583.....25c. to 50
Demidoffite 403.....1 50
Dendrites 181.....5c. to 50
DendriticManganes181..5c. to 50
Derbyshire Spar 123...10c. to 2 50
A. Dermatin 471.....50
Descloizite 609.....50c. to 10 00
Destinezite Sm. '82.....
Devilline 665.....1 00
Deweylite 469.....5c. to 50
Diabantite Ap. 3–37.....5c. to 25
Diaclasite 210.....
Diadelphite Sm. '84.....
Diadochite 588.....50
Diallage (green) 215...10c. to 50
" Metalloidal 208..10c. to 2 00
Diallogite 691.....10c. to 2 50
Diamond Bort 21.....75c. to 10 00
Diamond (crystal) 21.1 00 to 35 00
Dianite 516.....1 00
A.Diaphorite Ap. 1–4..1 00 to 3 00
Diaspore 168.....15c. to 2 00
Dichroite 299.....25c. to 1 00
Dickinsonite Ap.3–37.1 00 to 3 00
Dietrichite Ap.3–38...25c. to 75
Dihydrothenardite A.J.S. 35–418
A. Dillnite 421.....25c. to 75
A. Dimagnetite 151.....5c. to 1 50
Dimorphite 28.....1 00 to 5 00
Dinite 73.....
Diopside 214.....1 c. to 2 50
Dioptase 401.....50c. to 10 00
Dipyre 326.....15c. to 1 00
Discrasite 35.....25c. to 5 00
Disluite 149.....5c. to 5 00
Disterrite 508.....50c. to 1 00
Disthene 375.....15c. to 1 00
Dodecatylene 729.....
Dog-Tooth Spar 672.....5c. to 5 00
B. Dolerophanite Ap. 2–17...
Dolomite 681.....5c.to 2 50
Domeykite 36.....25c. to 5 00
Dopplerite 747, 749...25c. to 1 00
Doubly Refrac.Spar...10c to 10 00
Dreelite 626.....50c. to 1 50
Dry Bone 692.....10c. to 1 00
A. Dudleyite Ap. 2–17.....
Dufrenite 583.....5c. to 2 50
Dufrenoysite 92.....50c. to 1 50
A. Dumasite 503.....
Dumortierite Sm. '82...5c. to 5 00
Duporthite Ap. 3–39.....
A. Durangite Ap. 1–4..5c. to 50
Dürfeldite Ap. 3–40.....
Duxite Ap. 3–40.....
Dysanalyte Ap. 3–40....50 to 1 50
Dyscrasite 35.....5c. to 5 00
Dysluite 149.....5c. to 5 00
Dysodile 746.....50
Dysyntribite 479.....50
Earth Infusorial 199...5c. to 50
EarthyCobalt Bloom 559.5c.to 1 00
A. Edelforsite 212.....25
Edenite 235.....5c. to 1 00
Edingtonite 417.....
Edisonite A.J.S. 36–272.....
Edwardsite 539.....1 00
Egeran 276.....5c. to 2 50
Eggonite Ap. 3–40.....
Egyptian Jasper 189...25c. to 1 00
Ehlite 568.....50c. to 1 00
B. Ehrenbergite 458.....50
Eisen, *see* Iron.....
Eisenrose 143.....25c. to 2 50
Ekdemite Ap. 3–41.....
Ekebergite 324.....10c. to 1 00
Ekmannite 490.....50c. to 1 00
Elaeolite 328.....5c. to 1 50
Elastic Bitumen 734....5c. to 50
Elaterite 734.....5c. to 50
Electrosilicon 198.....10c. to 50
Eleonorite Ap. 3–13...50c. to 1 50
Eliasite 175.....1 00
Ellagite 430.....
Elpasolite Sm. '85.....
Elrouquite Ap. 3–41...75c. to 1 50
Embolite 115.....25c. to 5 00
Emerald 246.....1 00 to 10 00
" Nickel 710...15c. to 1 00
Emery 138.....5c. to 1 00
Emerylite 506.....15c. to 1 00
Emmonsite A. J. S. 31–476...
Empholite Sm. '83.....
Emplectite 86.....1 50
Enargite 107.....25c. to 2 00
Endecatylene 729.....
Endlichite Sm. '85.....1 00 to 3 00
Enstatite 208.....10c. to 2 00
Enysite Ap. 3–42.....10c. to 1 00
A. Eosite Ap. 1–5.....
Eosphorite Ap. 3–24.....1 50
A. Epiboulangerite Ap. 1–5..1 00
Epichlorite 493.....75
Epidote 281.....5c. to 5 00
A. Epigenite Ap. 1–5.....1 00
E. Epiphosphorite 535.....
Epistilbite 443.....1 50
Epsomite 643.....10c. to 1 00
Erdmannite 285.....25c. to 1 00
Erinite 569.....50c. to 1 00
Erlanite 797.....50c. to 1 00
Erubescite 44.....5c. to 5 00
Erythrite 558.....5c. to 2 50
A. Erythrosiderite Ap.2–19..
Erythrozincite Sm. '82.....
Esmarkite Ap. 2–19.....50
Essonite 266.....5c. to 2 50
A. Ettringite Ap.2–19.50c. to 1 00
Eucairite 39.....1 50 to 2 50

289 Euchlorite Ap. 3–80...50c. to 1 00
540 Euchroite 566..... 2 50
326 Euclase 379.....2 50 to 10 00
Eucrasite Ap. 3–43.....
Eucryptite Ap. 3–44.....
255 Eudialyte 248.....1 00 to 5 00
384 Eudnophite 433..... 75
260 Eulysite 259..... 50
336 Eulytite 391..... 1 25
198 A. Eumanite 165.....
807 Euosmite 743..... 50
432 Euphyllite 488..... 75
492 Eupyrchroite 530.....10. to 1 25
619 Eusynchite 609..... 1 00
479 Euxenite 521.....25c. to 1 50
571 Evansite 585.....50c. to 1 00
231 Eye-Agate 189.....1 50 to 5 00
125 Fahlerz 100.....10c. to 5 00
426 Fahlunite 484.....75c. to 1 25
Fairfieldite Ap. 3–45.....
231 False Topaz 189.....15c. to 1 50
132 B.Famatinite Ap.2–20..50c.to 1 50
378 Fargite 426..... 50
377 Faröelite 424.....50c. to 1 00
238 Fassaite 216.....25c. to 1 25
385 Faujasite 433..... 50
663 Fauserite 645..... 75
260 Fayalite 258..... 50
112 Feather Ore 91.....50c. to 1 50
316 Feldspar 352.....5c. to 5 00
551 " Blue 572.....5c. to 2 00
316 " Glassy 355...25c. to 1 50
316 A. " Green Ap.3–80..5c.to 25 00
316 " avanturine 355..25c.to 1 00
316 " pink 352.....25c. to 5 00
311 " Labrador 341...25c. to 2 00
316 Felsite 352.....5c. to 25
316 " sphaerulitic 359..5c.to 50
695 Felsobanyite 662.....1 00 to 2 00
Fer Vide Iron.....
612 Ferberite 604..... 1 00
483 Fergusonite 524.....50c. to 2 00
685 Fibroferite 656.....25c. to 1 50
323 Fibrolite 373..... .....5c. to 1 00
784 Fichtelite 735..... 1 00
555 Ficinite 590..... 75
Fiedlerite AJS 35–418.....
422 Figure Stone 480.....25c. to 1 50
Fillowite Ap. 3–47.....
232 Fiorite 199..... 50
115 Fire blende 93.....5 00 to 20 00
715 Fire Marble 679.....25c. to 2 50
232 Fire Opal 198.....5c. to 5 00
565 Fischerite 582..... 1 00
231 Flexible Sandstone 195.5c.to 1 00
231 Flint 195.....5c. to 25
232 Float Stone 199.....25c. to 1 00
724 Flosferri 694.....5c. to 5 00
163 Fluellite 126.....1 00 to 3 00
162 Fluocerine 126..... 75
161 Fluocerite 126..... 1 00
159 Fluorite 123.....5c. to 15 00
159 Fluor Spar 123.....5c. to 15 00
159 " Green 123.....5c to 10 00
159 " with moving bubble.50c.to1 50
99 Foliated Tellurium 82.50c.to 5 00
715 Fontainebleau Limes..50c.to 2 50
232 Forcherite 199.....25c. to 1 50
392 A. Foresite Ap. 2–22..50c. to 2 00
218 Forest Rock 187.....5c. to 1 00
257 Forsterite 255 ..... 15c. to 50
231 Fortification Agate 194..15c.to 5 00
241 Fowlerite 225.....5c. to 5 00
492 Francolite 531..... 50
Franklandite Ap. 3–48.....
188 Franklinite 152.....5c. to 10 00
125 Freibergite 101.....25c. to 75
114 Freieslebenite 93..... 3 00
399 French Chalk 451.....5c. to 25
20 A.Frenzelite Ap.2 22..1 00 to 10 00
Freyalite Ap. 3–48.....
Friedelite Ap. 3–48.....
293 Fuchsite 311.....10c. to 1 00
Fulgurite.....5c. to 50
299 Gabbronite 324.....25c. to 50
282 Gadolinite 293.....5c. to 25 00
185 Gahnite 149.....5c. to 5 00
378 Galactite 427.....50c. to 1 00
44 Galena-Galenite 40. ....5c. to 5 00
Galenobismutite Ap. 3–49...
Ganomaltite Ap. 3–49..... 1 00

269 Garnet 265.....5c. to 5 00
416 A. Garnierite Ap.2–23..5c. to 3 00
739 Gay, lussite 706.....25c. to 50
170 Gearksutite 130.....50c. to 1 25
Gedanite Ap. 3–51.....25c. to 50
246 Gedrite 231.....25c. to 50
321 Gehlenite 370.....25c. to 50
416 Genthite 471.....25c. to 1 00
822 Geocerellite 748.....
796 Geocerite 738.....
129 Geocronite 105..... 50
231 Geode Quartz 196.....10c. to 1 00
797 Geomyricite 739, 798.....
Gerhardtite Sm. '85.....
86 Gersdorffite 72.....50c. to 3 00
232 Geyserite 199.....25c. to 1 00
212 Gibbsite 177.....10c. to 1 00
715 Gibraltar Stone 680...25c. to 1 00
422 Gieseckite 479, 329.....15c. to 1 00
422 Gigantolith 480.....50c. to 1 00
429 A.Gilbertite 798Ap.2–24.25c.to 3 50
439 Gillingite 492.....50c. to 1 00
Ginilsite Ap. 3–51.....
372 Gismondite 418 .....25c. to 1 00
420 Glagerite 476..... 50
316 Glassy Feldspar 355...15c. to 1 50
640 Glauberite 627.....10c. to 1 00
93 A. Glaucopyrite Ap. 1–6..... 1 00
95 Glaucodot 80.....50c. to 1 50
409 Glauconite 462.....5c. to 50
251 Glaucophane 244.....25c. to 1 00
293 Glimmer 309.....5c. to 2 00
259 Glinkite 256..... 50
568 Globosite 584.....25c. to 1 00
696 Glockerite 662..... 50
420 Glossecollite 476..... 50
387 Gmelinite 436.....25c. to 5 00
316 Gneiss 359.....5c. to 15
1 Gold 3.....25c. to 10 00
11 Gold Amalgam 14.....1 50 to 5 00
422 Gongylite 480.....50c. to 1 00
254 Goshenite 245.....10c. to 1 00
666 Goslarite 647.....25c. to 1 00
204 Göthite 169.....5c. to 3 50
Goyazite Sm. '84.....
830 A. Grahamite 753.....10c. to 25
247 Grammatite 238.....10c. to 50
316 Granite 359.....5c. to 25
316 " Graphic 359....5c. to 25
98 Graphic Tellurium 81.25c. to 5 00
25 Graphite 24.....5c. to 1 00
364 Green Star Stone 412..10c. to 5 00
409 Green Earth 452.....5c. to 50
69 Greenockite 59.....15c. to 5 00
329 Greenovite 385 .....1 25 to 5 00
453 Grengesite 502..... 50
29 Gray Antimony 29....10c. to 25 00
125 Gray Copper 101.....10c. to 5 00
Griqualandite A.J.S.34–73.5c.to2 00
427 Groppite 486..... 1 00
269 Grossularite 266.....15c. to 1 50
330 Grothite 386..... 50
55 Grünauite 47.....
458 B.Guadalcazarite Ap2–25.1 00to3 00
490 D. Guano 535..... .....10c. to 1 00
Guanajuatite Ap.3–53..1 00 to 10 00
652 A. Guanovulite Ap. 2–64.....
328 Guarinite 383..... 50
Guejarite Ap. 3–54 .....
Guitermanite Sm. '84..50c. to 1 50
422 A. Gümbellite Ap. 1–6..... 50
216 Gummite 179.....10c. to 3 50
716 Gurhofite 682..... 1 50
813 Guyaquillite 745.....
413 Gymnite 469.....5c. to 50
654 Gypsum 637.....5c. to 2 50
342 Gyrolite 398... .....1 00 to 2 00
66 Haarkies 56.....15c. to 5 00
169 A. Hagemannite 130..15c. to 1 50
517 Haidingerite 552..... 1 50
66 Hair Nickel 56.....15c. to 5 00
138 Halite 112.....5c. to 1 00
445 C. Hallite Ap. 2–26.....10c. to 1 00
420 Halloysite 475.....15c. to 1 00
681 Halotrichite 654.....15c. to 75
Hanksite, Sm.'85.....25c. to 10 00
Hannayite Ap. 3–55.....
390 Harmotome 439.....25c. to 5 00
831 Hard Coal 755.....5c. to 25
61 C. Harrisite 53..... 2 50
785 Hartite 736..... 50

779 Hatchettite 731.....
Hatchettolite Ap. 3–56.....
76 Hauerite 64.....1 50 to 5
Haughtonite Ap. 3–77.....
195 Hausmannite 162.....25c. to 2
307 Haüynite 332.....25c. to 1
386 Haydenite 435.....25c. to 2
602 Hayesine 599.....5c. to 1
327 Haytorite 382.....
630 Heavy Spar 616.....5c. to 5
503 B. Hebronite Ap. 2–27..25c. to 1
238 Hedenbergite 215.....25c. to
494 Hedyphane 537.....75c. to 2
Heldburgite Ap. 3–56.....
231 Heliotrope 194.....5c. to 2
271 Helvite 264.....50c. to 1
Hemafibrite Sm. '84.....
180 Hematite 140.....5c. to 3
206 " Brown 172.....5c. to
Henwoodite Ap. 3–57..25c. to 1
90 Hepatic Pyrites 75.....5c. to 3
184 Hercynite 148.....10c. to 1
504 Herderite 546.....1 50 to 5
Herrengrunditе Ap.3–57 10c. to 5
388 Herschelite 437.....50c. to 1
835 Hessenbergite 762.....
58 Hessite 50.....1 50 to 5
Hetaerolite Ap. 3–58...50c. to 1
112 Heteromorphite 91.....25c. to 1
218 Heterogenite•Ap. 2–27..... 1
Heubachite Ap. 3–58.....
394 Heulandite 444.....25c. to 1
247 Hexagonite Ap. 3–5.....5c. to 1
476 Hielmite 519.....
722 Himbeerspath 691.....50c. to 2
819 Hircite 747.....
435 Hisingerite 489.....
409 Hislopite 463.....
556 Hitchcockite 577.....
522 Hoernesite 556.....
Hofmannite Ap. 3–59.....
Hohmannite A.J.S.36–155...
Homilite Ap. 3–59.....
828 Honeystone 759.....25c. to 1
231 Hone Stone 195.....5c. to
500 Hopeite 544.....
81 A. Horbachite Ap. 2–28.....
247 Hornblende 235.....5c. to 3
235 " Labrador 209..25c.to 3
140 Horn Silver 114.....10c. to 3
231 Horn Stone 195.....15c. to
49 Horse-flesh Ore 45.....5c. to 5
Horsfordite A.J.S. 36–156 ...
238 Hortonite 222.....25c. to 1
259 A. Hortonolite Ap.1–7..25c.to 1
214 Houghite 179.....15c. to 1
744 Hovite 709.....
601 Howlite 598.....10c. to 2
Huantajayite Ap. 3–60.....
44 A. Huascolite 42.....
611 Hübnerite 603.....50c. to 2
238 Hudsonite 216.....25c. to
Huntillite Ap. 3–71.....
758 Humboldtine 718.....
Huminite Ap. 3–60.....
319 Humite 364.....25c. to 3
531 Hureaulite 561.....25c. to 1
310 C. Huronite 349.....
597 A. Huyssenite 799.....
420 E. Hverlera 478 .....
681 Hversalt 655.....25c. to
272 Hyacinth 274.....15c. to 1
232 Hyalite 199.....15c. to 1
253 A. Hyalomelan 245.....
259 Hyalosiderite 257.....25c. to
Hyalotekite Ap. 3–60.....
313 Hyalophane 346.....
212 Hydrargillite 177.....10c. to 1
761–766 Hydrid, Pentylic, etc. 720
490 G. Hydroapatite 535...25c. to 5
Hydrocastorite Ap. 3–61.....
Hydrohalite Ap. 2–29.....
Hydrorhodonite Ap. 3–61...
Hydrophilite Ap. 2–29.....
596 Hydroboracite 595.....
Hydrocerussite Ap. 3–61.....
Hydrocuprite Ap.2–28..10c.to 1
634 A. Hydrocyanite Ap. 2–29...
741 Hydrodolomite 708...10c. to
Hydrogiobertite Sm. '85.....
740 Hydromagnesite 707..10c. to 1

rdromica.....5c. to 50
rdrophane 199.....50c. to 1 25
rdrophite 470..... 75
Hydrosilicite 799..... 50
rdrosteatite 453..... 25
rdrous Pyrites 75.....5c. to 2 50
Anthophyllite 242..5c. to 75
Bibasic Arsenite of Ni & Co..560
" Al_2O_3 & CuO Phosphate 587
rdrotalcite 178.....10c. to 1 00
Hydrotephroite 260..... 75
rdrotitanite Ap.3-91.10c.to 2 00
rdrozincite 711.....10c. to 1 00
Hygrophilite Ap.2-29..... 75
rpersthene 209.....15c. to 2 50
rpochlorite 392..... 50
rposclerite 350..... 75
rpostilbite 441..... 1 00
rstatite 144..... .....25c. to 75
sland Spar 677.....5c to 10 00
thyophthalmite 415.25c.to25 00
calite 738.....50c. to 1 00
ocrase 276.....15c. to 5 00
esiasite 700.....75c. to 5 00
leite Ap. 3-62.....
site Ap. 3-62.....
uenite 144.....5c. to 2 00
Ilsemannite Ap. 1-7.....
vaite 296.....25c. to 3 00
dianite 337.....25c. to 1 00
dicolite 367.....25c. to 2 00
durated Talc 452.....5c. to 25
dobromite Ap. 3-63.....
dyrite 117..... .....1 00 to 7 50
dite 299.....10c.to 3 50
nite Ap. 3-63.....
idosmine 12.....10c. to 1 00
on 15.....25c. to 10 00
' Alum 654.....15c. to 75
' Arsenate 578.....25c. to 2 00
' " Cupreous 574..15c.to 1 25
' Arsenical 78.....10c. to 2 00
' Carbonate 688.....5c. to 5 00
' Chromic 153.....5c. to 50
' Earth, Blue 556...5c. to 3 00
' Flint.....5c. to 50
' Glance 140.....5c. to 5 00
' Magnetic 149.....5c. to 5 00
' Meteoric 16.....25c. to 10 00
' Micaceous 149.....5c. to 1 00
' Oxyd 140.....5c. to 5 00
' Phosphate 564.....5c. to 3 00
' Roses 143.....50c. to 5 00
' Rutile 169.....5c. to 3 50
' Silicate 243.....5c. to 2 00
' Spar, Spathic 668..5c. to 5 00
' Specular 140.....5c. to 5 00
' Stone, Blue 555.....5c. to 3 00
' " Clay 141....5c. to 50
' Ore, Bog 172.....5c. to 25
' " Brown 172...5c. to 50
' " Green 583...10c. to 3 00
' " " Ochreous 140-169.5c.to 25
on Ore, Octahedral 149.10c.to5 00
' " Red 140.....5c. to 25
' " Titanic 143....5c. to 2 00
' " Jaspery 141..10c. to 50
' Pyrites 62.. .....5c. to 2 00
' " Arsenical 78 10c.to2 00
' " Magnetic 58..10c.to5 00
' " White 75...5c. to 5 00
' Sinter 574.....15c. to 50
' Spinel 148.....10c. to 5 00
Iserite 145.....15c. to 50
Isoclasite Ap. 1-7..... 75
Isopyre 392.....25c. to 1 00
columite 195.....10c. to 1 00
nerite 333..... 50
narite 391..... 50
Ivigtite Ap. 1-7,....25c. to 3 50
olyte 736..... 1 00
ksonite 411.....25c. to 1 00
Jacobsite Ap. 1-8...25c. to 1 00
Jadeite, Jade 292...50c. to 2 00
mesonite 90.....25c. to 1 00
rgoon 273..... 1 50
rosite 660..... 1 25
per 195.....5c. to 1 00
silingite 800..... 1 25
fferisite 494.....5c. to 1 00
ffersonite 215.....15c. to 2 00

269 E. Jelletite 269.....75c. to 1 50
415 Jenkinsite 470.....25c. to 1 50
233 Jenzschite 201.....
Jeremejeffite Sm. '83.....
831 Jet 755.....15c. to 1 00
273 Jevreinoffite 277..... 1 50
705 Johannite 666.....1 00 to 3 00
440 Jollyte 492.....
107 Jordanite 88.....1 00 to 15 00
32 Josëite 31.....1 00 to 3 00
645 Jossaite 631..... 2 50
127 A. Julianite Ap. 1-8..... 75
721 Junckerite 688.....5c. to 5 00
193 Jurinite 164.....5c. to 10 00
K German often equals C English
Kainosite A. J. S. 31, 476.....
674 Kalinite 652.....
Kalk, see Lime.....
656 A. Kaluszite Ap.2-54..10c. to 3 00
448 Kammererite 496.....25c. to 1 00
494 Kampylite 537.....25c. to 2 50
73 Kancite 61..... 75
419 Kaolinite 473.....5c. to 50
554 A. Kapnicite 576..... 50
223 Karelinite 185..... 1 00
632 Karstenite 621.....25c. to 75
241 Keatingine Ap 3-104..15c. to 1 00
420 F. Keffekilite 478..... 50
Kentrolite Sm. '82..... 1 00
331 Keilhauite 387.....
226 Kermesite 186.....25c. to 1 00
414 Kerolite 470.....15c. to 50
447 A. Kerrite Ap. 2-31.....
712 Kerstenite 669.....
206 Kidney-Stones 172.....5c. to 50
Kiesel equals Silica.....
655 Kieserite 641.....10c. to 75
422 Killinite 480..... 50
732 Kischtimite 703.....
495 A. Kjerulfine Ap. 2-31..... 1 00
121 A. Klaprotholite Ap. 1-8..... 1 00
468 Klipsteinite 511..... 50
263 Knebelite 260..... 75
123 Kobellite 99..... 75
483 A. Kochelite Ap. 1-8.....
276 A. Kœlbingite 284.....
247 B. Kokcharoffite 242..... 1 00
238 Kokkolith 215.....10c. to 50
518 A. Kollophan Ap. 1-9.....
269 Kolophonite 269.....5c. to 1 50
10 A. Kongsbergite Ap. 2-32.... 1 00
Koninckite Sm. '84.....
793 Könlite 737.....
471 A. Koppite Ap. 2-32..... 1 00
496 A. Korarfveite Ap. 2-32.....
179 Korund 138.....5c. to 2 00
450 Kotschubeite 498..... 2 00
530 Köttigite 561.....
333 Koupholite 410..... 50
316 Krablite 359..... 50
799 A. Krantzite 741..... 50
185 Kreittonite 149..... 75
149 Kremersite 119..... 75
Krennerite Ap. 3-66..2 50 to 5 00
378 Krokalite 426..... 50
Krönnkite Ap. 3-66..... 50
249 Krokydolite 243.....5c. to 2 00
164 Kryolith 126.....5c. to 5 00
501 Kühnite 544..... 1 00
12 Kupfer, see Copper 14..5c. to 5 00
127 Kupfer Blende 104.....50c. to 5 00
172 Kupferblüthe 173.....10c. to 2 50
71 Kupfernickel 60.....25c. to 3 50
245 Kupfferite 230..... 1 00
324 Kyanite 375.....5c. to 2 00
90 Kyrosite 76..... 50
311 Labradorite 341.....5c. to 2 00
605 Lagonite 600..... 75
697 Lamprophanite 663.....
641 Lanarkite 628.....1 00 to 5 00
Lanbanite A.J.S. 35-418.....
740 Lancasterite 708.....25c. to 1 00
Langbanite A. J. S. 34-72.....
702 Langite 665.....25c. to 1 50
Lansfordite A. J. S. 36-156...
745 Lanthanite 709..... 5 00
306 Lapis Lazuli 331.....10c. to 5 00
604 Larderelite 600..... 50
343 Laumontite 399.....5c. to 1 00
Laurionite A. J. S. 35-418....
89 Laurite 74..... 5 00

Lautite Ap. 3-67.....
316 Lava 359.....5c. to 1 00
526 B. Lavendulan 560.....25c. to 1 50
Lavenite Sm. '85.....
Lawrencite Ap. 3-67.....
644 A. Laxmannite Ap. 1-9..... 2 50
316 Lazurfelspar 356.....25c. to 5 00
551 Lazulite 572.....15c. to 2 50
15 Lead 17.....1 00 to 3 00
119 " Antimonial Sulphid.10cto10 00
44 " Argentiferous 41....5c. to 2 00
494 " Arsenate 537.....10c. to 3 50
25 " Black 24.....5c. to 1 00
729 " Carbonate 700.....10c. to 5 00
733 " Chloro-Carb. 703...50c. to 5 00
642 " Chromate 628.....50c. to 5 00
617 " Molybdate 607.....5c. to 25 00
493 " Ore, Green 535.....10c. to 5 00
617 " " Yellow 607.....5c. to 25 00
150 " Oxy-Chlorid 119...25c. to 5 00
197 " Oxyd 163.....50c. to 3 50
493 " Phosphate 535.....10c. to 5 00
729 " Spar 700.....10c. to 5 00
633 " Sulphate 622.....15c. to 5 00
616 " Tungstate 606.....25c. to 5 00
621 " Vanadate 610.....5c. to 15 00
633 " Vitriol 622.....25c. to 5 00
729 " White 700.....10c. to 5 00
635 Leadhillite 624.....1 00 to 10 00
Leather, Mt. Ap.3-94..10c. to 1 00
57 Leberblende 50..... 75
652 Lecontite 635.....
387 Ledererite 437.....1 50 to 5 00
329 Lederite 385.....5c. to 1 50
316 Leelite 353.....15c. to 50
47 Lehrbachite 44..... 75
378 Lehuntite 426..... 50
Leidyite Ap 3-68.....10c. to 1 00
316 Lennilite 356.....25c. to 1 00
343 A. Leonhardite 401....50c. to 1 00
204 Lepidokrokite 170.....15c. to 1 00
294 Lepidolite 314.....5c. to 1 50
290 Lepidomelane 307.....50c. to 1 00
703 Lettsomite 666.....1 50 to 3 00
091 Leucanterite 660..... 50
451 Leuchtenbergite 500..... 1 50
309 Leucite 334.....5c. to 2 00
Leucochalcite Sm. '82.....
8 6 Leucopetrite 743.....
264 Leucophanite 260..... 75
91 Leucopyrite 76.....25c. to 1 00
Leucotile Ap. 3-69..... .....
382 Levynite 431.....50c. to 1 00
535 Libethenite 563.....10c. to 2 50
422 Liebenerite 479..... 50
754 Liebigite 717..... 2 00
284 Lievrite 296.....10c. to 3 50
118 Light Red Silver 96...50c. to 10 00
831 Lignite 755.....5c. to 50
443 Lillite 493..... 1 00
414 A. Limbachite Ap. 2-34.....
715 Lime Carbonate 670.....5c. to 10 00
751 B. Lime Malachite 715..25c. to 1 50
573 Lime Uranite 586.....5c. to 2 50
715 Limestone 678.....5c. to 25
213 Limnite 178..... 25
206 Limonite 172..... .....5c. to 1 00
700 Linarite 663.....25c. to 5 00
583 Lindackerite 590..... 1 00
81 Linnaeite 68.....25c. to 3 50
310 Linseite 340..... 75
542 Liroconite 567.....1 00 to 5 00
Liskeardite Ap.3-70...25c. to 1 00
294 Lithia Mica 314.....5c. to 1 50
320 " Tourmaline 367..10c.to 10 00
218 D. Lithiophorite Ap.1-9..25c.to 1 50
715 Lithographic Stone 679..5c.to 25
406 Lithomarge 460.....10c. to 50
Lithiophyllite Ap.3-124.50c.to 1 25
29 A. Livingstonite Ap.2-35.50cto2 50
186 Lodestone 149.....5c. to 5 00
93 Lölingite 77..... 75
90 Lonchidite 76..... 50
660 Löweite 643..... 75
690 Löwigite 659..... 1 00
316 Loxoclase 355.....5c. to 50
Lucasite A. J. S. 32, 375.....
Ludlamite Ap. 3-70...15c. to 2 00
595 A. Ludwigite Ap.2-35..50c. to 2 00
715 Lumachelle 679.....50c. to 2 00
598 A. Lüneburgite Ap.1-10..... 50

231 Lydian-stone 195.....10c. to 50
447 B. Maconite Ap. 2–36..... 1 00
322 Macle 371.....10c. to 1 50
715 Madrepore Marble 679.25c.to 1 00
155 Magnesia Chlorid 122.....
269 " Garnet 267..25c. to 75
597 " Borate 595...25c. to 1 50
210 " Hydrate 175.10c.to 10 00
740 " Hydrocarbonate707.25c.1 50
187 Magnesioferrite 152...50c. to 1 50
718 Magnesite 685.....5c. to 50
186 Magnet, Native 149.....5c. to 5 00
68 Magnetic Pyrites 58....5c. to 3 50
186 Magnetite 149.....5c. to 5 00
187 Magnoferrite 152..... 75
751 Malachite 713.....5c. to 10 00
751 B. " Lime 715..... 50
752 " Blue 715.....5c. to 10 00
238 Malacolite 214.....25c. to 1 00
272 A. Malacon 275.....50c. to 1 50
1 A. Maldonite Ap. 1–10.....
Mallardite Ap. 3–72.....
Maltha 728..... 50
657 Mamanite 642.....
241 Mangan Amphibol 225.25c. to 1 50
52 " Blende 46.....50c. to 5 00
277 " Epidote 285...50c. to 1 00
195 Manganese, Black 162..25c.to 1 50
218 A. " Bog 181.....5c. to 1 00
156 " Chlorid 122.....
722 " Carbonate 691.10c.to 3 50
218 " Earthy 181.....5c. to 1 00
199 " Gray 165.....5c. to 2 00
205 " Ore, Hard 170.10c. to 5 00
199 " Oxyd 165.....5c. to 2 00
217 " " Hydrous180.5cto 1 00
499 " Phosphate 543.15c.to 1 00
241 " Red Spar 225...5c. to 5 00
241 " Silicate 225.....5c. to 5 00
52 " Sulphide 43...50c. to 5 00
205 Manganite 170..... ....10c. to 5 00
725 Manganocalcite 697..... 1 25
241 Mangankiesel 225.....5c. to 5 00
722 Manganspath 691.....5c. to 5 00
290 A. Manganophyllite Ap.2–37 1 00
Manganosite Ap. 3–73.....
Manganostibiite Sm. '84.....
715 Marble 678.....5c. to 1 00
715 " Breccia 679.....10c. to 50
715 " Carrara 678..... 5c. to 50
715 " Encrinal 679...15c. to 1 00
715 " Landscape 679.50c. to 3 00
715 " Madreporic 679.25cto 1 00
715 " Parian 678.....15c. to 1 00
715 " Ruin 679.....25c. to 3 00
411 " Serpentine 464.15c. to 1 00
715 " Shell 679.....15c. to 1 00
715 " Sienna 678.....10c. to 50
411 " Verd Antique 465.25c.to1 00
90 Marcasite 75.....5c. to 5 00
241 Marceline 226.....50c. to 1 00
316 Marekanite 359.....10c. to 1 50
459 Margarite 506.....10c. to 50
439 Margarodite 487.....10c. to 1 00
393 Marialite 326 .....25c. to 1 00
715 Marl 679.....5c. to 25
Marmairolite Ap. 3–74.....
56 Marmatite 48.....50c. to 1 00
411 C. Marmolite 495.....10c. to 50
655 Martinsite 641..... 50
180 A. Martite 142.....5c. to 1 50
650 Mascagnite 635..... 50
309 A. Maskelynite Ap. 2–37.....
458 Masonite 505.....5c. to 1 00
177 Massicot 136.....
150 Matlockite 119.....50c. to 10 00
Matricite Ap. 3–74.....
635 A. Maxite Ap. 2–38..... 1 00
707 Medjidite 667.....
Meerschaluminte Ap. 2–38...
402 Meerschaum 456.....5c. to 1 00
613 Megabasite 604.....10c. to 1 50
297 Meionite 318.....15c. to 2 00
178 Melaconite 136.....10c. to 2 00
498 E. Melanchlor 543..... 1 25
827 Melanellite 750.....
Melanocerite A. J. S. 35–417...
830 B. Melanasphalt 753..... 50
811 Melanchyme 744.....25c. to 50
425 Melanhydrite 483..... 50
269 E. Melanite 267.....5c. to 2 50
435 Melanolite 490..... 50
Melanosiderite Ap. 3–75..... 1 00
Melanotekite Ap. 3–75.....
664 Melanterite 646.....25c. to 50
274 Melilite 280..... .....25c. to 1 00
420 B. Melinite 477..... 25
268 Meliphanite, Melinophane 1 00
828 Mellite 750.....10c. to 1 00
100 A. Melonite 801..... 1 25
420 G. Melopsite 478..... 50
181 Menaccanite 143.....5c. to 2 00
151 Mendipite 120.....50c. to 2 00
677 Mendozite 653.....
128 Meneghinite 105.... ...50c. to 5 00
485 Mengite 525..... 1 00
232 Menilite 199..... .....15c. to 1 00
8 Mercury 13.....5c. to 2 50
64 " Sulphide 55...5c. to 5 00
Meroxene 306, Ap. 3–76..25c.to 3 00
719 Mesitite 687..... 50
381 Mesolite, Mesotype 430..5c.to 1 50
519 Metabrushite 553..... 1 00
455 Metachlorite 503.....50c. to 1 00
64 A. Metacinnabarite Ap. 1–10 1 50
13 Meteoric Iron 16.....25c. to 50 00
13 Meteoric Stone 16.....1 50 to 50 00
225 A. Meymacite Ap. 2–38..... 75
724 Mexican Onyx 694.....25c.to 1 50
108 Miargyrite 88.....1 00 to 5 00
293 Mica 309.....5c. to 2 00
289 " Black 304.....5c. to 1 50
548 " Copper 571.....25c. to 2 00
294 Mica-lithia 314.....10c. to 2 00
25 Mica pictoria 24.....5c. to 50
293 " picture 309.....5c. to 25
316 " schist 359.....5c. to 25
288 " star 302.....10c. to 50
279 B. Michaelsonite 289.....
316 A. Microcline Ap. 3–80..5c. to 25 00
472 Microlite 513.....50c. to 5 00
316 Microlites App.2–39...10c. to 50
Microplakite Ap.2–39 } See La-
Microphyllite Ap.2–39 } bradorite
305 A. Microsommite Ap. 2–39...
814 Middletonite 745.....
232 Milkopal 198.....5c. to 1 00
Milarite Ap.1–10.....75c. to 2 50
66 Millerite 56.....10c. to 5 00
465 Miloschite 510..... 50
494 Mimetite 537..... .....10c. to 3 50
831 Mineral coal 753.....5c. to 50
782 " caoutchouc 734..5c.to 25
830 " oil 723.....5c. to 25
830 " pitch 751.....5c. to 50
798 " resin 739.....5c. to 50
419 " soap 473 .....10c. to 50
197 Minium 163.....50c. to 5 00
653 Mirabilite 636.....
Miriquidite Ap. 2–40.....
628 Misenite 615.. .....
94 Mispickel 78.....10c. to 2 00
683 Misy 655.....5c. to 1 50
Mixite Ap. 3–82.....25c. to 2 00
301 Mizzonite 325.....50c. to 1 50
231 Mocha stone 195.....5c. to 1 50
551 Mollit 572.....5c. to 3 50
617 Molybdate of Lead 607..5c to 25 00
34 Molybdenite 32.....5c. to 2 50
224 Molybdite 185.....25c. to 1 50
146 Molysite 118.....
496 Monazite 539.....5c. to 5 00
505 Monimolite 546..... 1 00
356 Monradite 406..... 50
323 Monrolite 373..... 75
711 Montanite 668..... 1 00
258 Monticellite 255.....15c. to 1 50
654 Montmartite 638.....25c. to 50
406 Montmorillonite 459..25c. to 1 00
503 C. Montebrasite Ap.2–27..5c.to 50
314 Moonstone 347,354.....10c. to 2 00
396 Mordenite 446..... 1 00
668 Morenosite 648..... 1 00
361 A. Moresnetite 409..... 75..
231 Mormorion 193.....5c. to 25 00
691 Moronolite 660..... 50
492 Moroxite 531 .....25c. to 1 00
231 Moss Agate 195.....10c. to 1 50
724 Mossottite 696.....25c. to 1 50
283 Mosandrite 295.....50c. to 1 50
Mottramite Ap. 3–83..... 1 00
Mountain cork Ap.3–94.25c.to 1 00
751 " Green 713.....5c. to
" Paper Ap.3–9410c.to
Muckite Ap.3–83.....
232 Mullers Glass 199.....25c. to
524 Mullicite 556.....5c. to
75 Mundic 62.....5c. to
632 Muriacite 621.....10c. to
279 Muromontite 289.....
293 Muscovite 309.....5c. to
293 Muscovy Glass 309.....5c. to
731 Musite 702.....
238 Mussite 214. .....25c. to
751 A. Mysorin 715.....
293 Nacrite 309, 473.....10c. to
510 Nadorite Ap. 1–11.....1 00 to
Naesumite Ap. 1–11.....
99 Nagyagite 82.....50c. to
61 Nailhead Copper Ore 52.50c.to
715 " Spar 670.....10c. to
214 A. Namaqualite Ap. 1–11...
146 A. Nantokite Ap. 1–11.....
768 Naphtha 723.....10c. to
794 Naphthalin 738.....
378 Natrolite 426.....10c. to
736 Natron 705.....
41 Naumannite 39 .....50c. to
316 Necronite 355.....
204 Needle Iron Ore 169....5c. to
124 " Ore 100.....50c. to
724 " Spar 694.....25c. to
378 " Zeolite 426.....10c. to
781 B. Neft-gil 734.....
404 E. Nefedieffite Ap. 2–41.....
210 Nemalite 175.....15c. to
Neudorfite Ap. 3–84.....
Neociano Ap. 3–84.....
553 Neoctese 574.....
357 Neolite 406.....
437 Neotocite 491.....
304 Nephelite 327..... ....5c. to
Nephrite 801.....
420 Nertschinskite 476.....
423 A. Neurolite 482.....
Newberryite Ap. 3–84.....
Niartinite A. J. S. 35–418...
71 Niccolite 60.....25c. to
Niccochromite Ap.3–85..25c.to
Nickel Ap. 2–41.....
72 " Antimonial 61...50c.to
508–509 " Arsenate 548.....
71 " Copper 60.....25c. to
747 " Emerald 710....15c. to
86 " Glance 72.....50c. to
416 " Gymnite 471.....10c. to
416 " Silicate 471.....10c. to
66 " Sulphid 56.....25c. to
231 Nicolo or Onicolo 195.25c. to
54 Nicopyrite, Nickel Pyrite 47
247 G. Nigrescite Ap. 1–12.....
193 Nigrin 160.....5c. to
474 Niobite 515.....5c. to
590 Nitre 592.....25c. to
591 Nitratine 592.....
592 Nitrocalcite 593.....
Nitroglauberite Ap. 2–41...
593 Nitromagnesite 593.....
Nocerite Ap. 3–85.....
478 A. Nohlite Ap. 2–41.....
247 Noralite 236.....
247 Nordenskioldite 233.....
308 Nosite 333.....25c. to
416 A. Noumaeite Ap.2–23.50c. to
231 Novaculite 189.....5c. to
493 Nussierite 535.....
299 Nuttallite 320.....25c. to
316 Obsidian 359.....5c. to
227 Ochre Antimony 187..10c. to
224 " Molybdic 185...25c. to
180 " Red 140.....5c. to
" Uranium.....50c. to
206 " Yellow 172.....5c. to
180 Ochery Iron Ore 140....5c. to
420 C. Ochran 477.....
194 Octahedrite 161.....50c. to
172 Octahedral Copper Ore133.5c.
186 " Iron Ore 149..5c.
433 Œllacherite 489.....
272 D. Œrstedite 275.....5c. to
Oil, Genesee or Seneca 725..
194 Oisanite 161.....50c. to
341 Okenite 398.....

56 A. Oldhamite Ap. 2–42.....
180 Oligiste Iron 140.....5c. to 5 00
314 Oligoclase 346.....25c. to 1 50
536 Olivenite 564.....10c. to 3 50
259 Olivine 257.....5c. to 2 50
411 Ollaris 464.....5c. to 25
238 A. Omphacite 223..... 50
204 Onegite 170.....50c. to 1 50
422 Oncosine 480..... 1 00
65 A. Onofrite 55..... 75
231 Onyx 195, 680.....15c. to 3 00
715 Oolite 679.....5c. to 50
206 " Iron Stone 172..5c. to 50
422 Oosite 480..... 75
232 Opal 198.....5c. to 50 00
232 " Agate 198.....10c. to 5 00
232 " Common 198.....5c. to 1 00
232 " Fire 198.....5c. to 50 00
232 " Jasper 199.....10c. to 1 50
232 " Precious 198. ....25c. to 50 00
232 " Semi 199.....5c. to 50
235 " cut for setting...25c. to 50 00
232 " Wood 199.....10c. to 1 00
231 Opalized Wood 199.....10c. to 2 00
411 Ophiolite 465.....5c. to 50
468 Opsimose 511..... 50
1 Or Natif (Gold) 3.....25c. to 10 00
336 Orangite 413.....50c. to 5 00
420 D. Oravitzite 477..... 75
Ores, see Iron and various metals
Oriental, applied to finer gems
Orileyite Ap. 1–12.....
27 Orpiment 27.....10c. to 5 00
278 Orthite 287.....10c. to 3 50
316 Orthoclase 352.....5c. to 10 00
316 " Pink 352...25c. to 10 00
316 " Twin.....10c. to 5 00
Osbornite Ap. 1–12.....
7 Osmiridium 12.....50c. to 5 00
490 A. Osteolite 533.....25c. to 1 00
272 Ostranite 273..... 75
458 A. Ottrelite 506.....10c. to 1 00
269 Ouvarovite 270.....25c. to 10 00
460 Owenite 507..... 50
Oxides, see Iron & various metals
377 Ozarkite 424, 329.....10c. to 1 00
780 Ozocerite 732.....5c. to 50
168 Pachnolite 129.....15c. to 2 00
96 Pacite 81.....
422 Pagodite 480.....15c. to 25
241 Paisbergite 225..... 1 00
425 Palagonite 483..... 50
358 Paligorskite 403.....
5 Palladium Native 12.....
600 A. Pandermite Ap. 3–97. 10c. to 50
181 Paracolumbite 144.....5c. to 50
Paraffin (Coal) 730..... 25
431 Paragonite 487..... 50
693 Paraluminite 661.....
298 Paranthine 318..... 50
836 Parathorite 763..... 1 00
247 Pargasite 235.....10c. to 50
731 Parisite 702..... 3 00
281 Partschinite 293..... 75
228 Partzite 188 .....25c. to 1 50
684 A. Pastreite 655..... 50
618 Pateraite 608..... 1 00
Pattersonite Ap. 1–18 .....
235 Paulite 209..... 1 00
715 Peastone 679.....15c. to 25
716 Pearl Spar 682.....10c. to 1 50
316 Pearlstone, Pearlite 359. 10c. to 50
831 Peat 758.....5c. to 25
339 Pectolite 396.....5c. to 3 00
564 Peganite 582..... 50
316 Pele's Hair 360..... 25
743 Pencatite 708..... 75
448 Penninite 495.....15c. to 1 50
741 Pennite 708.....25c. to 1 00
Pennoite Sm. '85.....
54 Pentlandite 47..... 50
154 Percylite 122..... 1 00
173 Periclasite 134..... 75
315 Pericline 350.....25c. to 2 00
259 Peridot 256.....5c. to 1 50
315 Peristerite 350.....10c. to 3 00
182 Perofskite 146.....5c. to 5 00
316 Perthite 356.....50c. to 1 00
244 Petalite 229.....10c. to 1 00
231 Petrified Wood 196.....5c. to 5 00
767 Petroleum 723.....15c. to 50
646 Pettkoite 631.....
58 A. Petzite 51.....50c. to 5 00
234 Phaestine 209..... 50
386 Phacolite 435.....25c. to 1 00
520 Pharmacolite 554.....50c. to 1 00
558 Pharmacosiderite 578. 15c to 2 50
267 Phenacite 263.....10c. to 10 00
Phillipite Ap. 3–92.....
389 Phillipsite 438.....25c. to 1 00
288 Phlogopite 202.....5c. to 2 50
643 Phoenicochroite 630.....
418 Pholerite 472.....25c. to 75
316 Phonolyte 359..... 25
733 Phosgenite 703.....25c. to 5 00
524 Phosphate of Iron 556. 5c. to 3 00
493 " Lead 535. 5c. to 5 00
543 Phosphochalcite 568..... 50
Phosphuranylite Ap. 3–92...
492 Phosphorite 531.....15c. to 50
241 B. Photicite 227.....25c. to 50
231 Phthanyte 195..... 75
458 A. Phyllite 506.....5c. to 75
325 Physalite 377..... 75
830 C. Piauzite 753..... 75
678 Pickeringite 653..... 50
383 Picranalcime 433..... 75
Picroallumogene Ap. 3–93... 50
Picroepidote Sm. '83.....
470 A. Picrofluite 512.....
411 Picrolite 465.....5c. to 1 00
658 Picromerite 642.....10c. to 1 50
520 A. Picropharmacolite 555.....
352 Picrophyll 406..... 75
377 Picrothompsonite 426..... 1 00
349 Picrosmine 405..... 50
146 A. Piddingtonite 232.....
277 Piedmontite 285.....25c. to 1 00
829 Pigotite 750.....
401 Pihlite 455..... 50
Pilinite Ap. 3–93..... 75
Pilolite Ap. 3–94.....10c. to 1 00
460 Pimelite 510..... 75
422 Pinite 479.....25c. to 1 00
Pipestone 796.....10c. to 50
665 Pisanite 646..... 75
715 Pisolite 679.....5c. to 50
694 Pissophanite 661..... 50
276 Pistacite 281.....25c. to 1 00
720 Pistomesite 688..... 50
830 Pitch, Mineral 751.....5c. to 25
190 Pitchblende 154.....25c. to 2 00
316 Pitchstone 359.....15c. to 25
354 Pitkarandite 405..... 75
830 Pittasphalt 751.....5c. to 25
581 Pitticite 589..... 50
Plagiocitrite Ap. 3–94.....
Plagioclase 802.....
109 Plagionite 89.....75c. to 2 50
554 B. Planerite 576..... 1 00
231 Plasma 194.....25c. to 75
654 Plaster Stone 637.....5c. to 1 00
3 Platinum 10.....10c. to 10 00
4 Platiniridium 11.....
201 Plattnerite 167..... 1 00
Plomb (or Plumbum) *vide* Lead
349 A. Plombierite 802..... 75
25 Plumbago 24.....5c. to 2 00
Plumballophane Ap. 1–12...
556 Plumbogummite 577..... 2 00
112 Plumosite 91.....25c. to 1 50
199 Polianite 166..... .....25c. to 1 50
256 Pollucite 249.....2 00 to 5 00
269 Polyadelphite 269.....5c. to 1 50
40 C. Polyargyrite Ap. 1–12.....
Polyarsenite Sm. '85.....
131 Polybasite 107.....1 00 to 15 00
426 Polychroilite 485..... 50
Polydymite Ap. 3–95.....
656 Polyhalite 641.....25c. to 1 00
442 Polyhydrite 493..... 50
481 Polykras 523..... 75
238 Polylite 216..... 50
482 Polymignite 523.....35c. to 1 00
493 Polysphaerite 536..... 50
126 Polytelite 104..... 50
231 Porcelain Jasper 195....5c. to 50
316 Porphyry 359.....10. to 1 00
404 D. Portite 458.....
Posepnyte Ap. 3–96.....
399 Potstone 452.....15c. to 50
231 Prase 194.....25c. to 1 00
543 Prasin 568..... 1 00
232 Precious Opal 198.....10c. to 5 00
742 Predazzite 708..... 50
431 Pegrattite 487..... 50
363 Prehnite 410.....15c. to 3 00
715 Preunnerite 677..... 75
600 A. Priceite Ap. 2–45...10c. to 1 00
452 Prochlorite 501.....10c. to 2 00
171 Prosopite 130..... 1 25
Protovermiculite 67. ...5c. to 1 00
118 Proustite 96.....50c. to 10 00
56 Przibramite 48.....50c. to 2 00
Pseudobrookite Ap. 3–97.....
Pseudocotunnite Ap. 3–97. 1 00 2 50
543 Pseudomalachit 568. .50c. to 1 50
Pseudonatrolite Ap. 3–98.....
Pseudomorphs, see end of price list
217 Psilomelane 180.....5c. to 1 00
Psittacinite Ap. 3–98.....
624 Pucherite Ap. 1–12.....25c. to 3 00
316 Pumice 359.....5c. to 25
325 Pycnite 377..... .....15c. to 1 50
351 Pyrallolite 406..... 50
426 Pyrargillite 485..... 1 00
117 Pyrargyrite 94.....25c. to 15 00
75 Pyrites 62.....5c. to 5 00
94 " Arsenical 78..10c. to 2 00
75 " Auriferous 62. 10c. to 1 50
90 " Cockscomb 75..5c. to 5 00
78 " Copper 65.....5c. to 5 00
75 " Iron 62.....5c. to 5 00
68 " Magnetic 58...5c. to 5 00
90 " Radiated 75...10c. to 50
80 " Tin 68.....10c. to 50
215 Pyroaurite 179..... 50
471 Pyrochlore 512.....50c. to 1 50
211 Pyrochroite 177..... 75
199 Pyrolusite 165.....5c. to 1 50
493 Pyromorphite 535.....10c. to 5 00
269 Pyrope 267.....5c. to 50
400 Pyrophillite 454.....10c. to 1 50
325 Pyrophysalite 377..... 1 00
278 Pyrorthite 287.....50c. to 1 50
781 C. Pyropissite 734.....25c. to 75
809 Pyroretinite 744..... 50
445 Pyrosclerite 493..... 75
369 Pyrosmalite 414.....50c. to 7 50
115 Pyrostilpnite 93.....5 00 to 25 00
238 Pyroxene 212.....5c. to 5 00
837 Pyrrhite 763..... 1 00
68 Pyrrhotite 58.....5c. to 5 00
231 Quartz 189.....5c. to 25 00
231 " Agate 194.....5c. to 5 00
231 " Amethystine 193...5c. to 25 00
231 " Asteriated 193...50c. to 1 50
231 " Aventurine 193..1 00 to 2 00
231 " Babel 196.....50c. to 3 50
231 " Basanite 195.....10c. to 1 00
231 " Black 189.....5c. to 25 00
231 " Bloodstone 194...10c. to 3 00
231 " Capped 193.....25c. to 5 00
231 " Carnelian 194.....10c. to 1 50
231 " Cavernous 193...25c. to 1 50
231 " Cellular 189.....10c. to 1 00
231 " Chalcedonic 194...5c. to 10 00
231 " Conglomerate 195..5c. to 5 00
231 " Contain'g Asbestos 194 1 50
231 " " Anthracite 194....10c. 1 50
231 " " Chlorite 193..... 25c. 5 00
231 " " Gold 194.....1 00 to 10 00
231 " " Göthite 194.....25c. to 1 50
231 " " Hematite 193...25c. to 1 50
231 " " Hornblende 194.15c. to 2 00
231 " " Liquid 194.....50c. to 3 00
231 " " Rutile 194.....15c. to 5 00
231 " " Silver 194.....1 00 to 5 00
231 " " Stibnite 194....50c. to 1 50
231 " " Tourmaline 193..25c. to 1 50
231 " Chrysoprase 194.50c. to 2 50
231 " Drusy 193.....5c. to 1 00
231 " Ferruginous 193...5c. to 1 00
231 " Fibrous 193.....25c. to 1 00
231 " Flint 195.....5c. to 1 00
231 " Granular 195.....5c. to 15
231 " Greasy 193.....5c. to 25
231 " Green 189.....10c. to 5 00
231 " Hacked 189.....5c. to 50
231 " Heliotrope 194...10c. to 3 00
231 " Honestone 195....5c. to 25
231 " Hornstone 195....5c. to 25
231 " Jaspery 195.....5c. to 1 00

231 Quartz, Milky 193. .....5c. to 1 00
231 " Modified 193.....10c. to 5 00
231 " Moss Agate 195..10c. to 1 50
232 " Nectique 199.....5c. to 5 00
231 " Novaculite 195....5c. to 25
231 " Onyx 195.....15c. to 3 00
231 " Prase 194.....75c. to 2 00
231 " Pseudomorphous196.5cto5 00
232 " Resinite 198.....5c. to 5 00
231 " Rose 193 .....5c. to 2 00
231 " Sagenitic 193.....15c. to 5 00
231 " Sapphire 193.....10c. to 1 00
231 " Silicified Wood 196.5c.to 5 00
231 " Smoky 189.....5c. to 25 00
231 " Star (Stern) 193..50c. to 1 50
231 " Swimming 189...15c. to 75
231 " Tabular 196.....15c. to 1 50
231 " Vitreous 193.....5c. to 25 00
231 " Yellow 193.....10c. to 1 00
231 Quartzyte 189.....5c. to 25
Quenstedtite A. J. S. 36-156
350 Quincite 406..... 50
8 Quicksilver, Native 13.25c.to 3 00
64 " Sulphuret 65.10c.to 5 00
218 E. Rabdionite Ap. 1-13..... 1 50
90 Radiated Pyrites 75...15c. to 75
684 Raimondite 656.....
163 Ralstonite Ap. 1-13...1 00 to 3 00
92 Rammelsbergite 77 75
Randite Ap. 3-102.....50c. to 1 00
247 Raphilite 233..... 50
377 A. Rauite Ap. 2-47.....
428 Rastolyte 486..... 50
339 Ratholite 396.....25c. to 1 00
26 Rauschgelb 26.....50c. to 5 00
231 Rauch-quartz 189.....5c. to 25 00
406 A. Razoumoffskin 460..... 75
26 Realgar 26.....50c. to 5 00
Reddingite Ap. 3-102..... 1 00
Redondite Ap. 1-13..... 50
226 Red Antimony 186.....25c. to 2 50
180 " Chalk 141.....5c. to 25
526 " Cobalt 558.....10c. to 5 00
172 " Copper Ore 133.....5c. to 5 00
180 " Hematite 140.....5c. to 5 00
180 " Iron Ore 140.....5c. to 5 00
231 " Jasper 195.....5c. to 2 00
642 " Lead Ore 628.....5c. to 5 00
180 " Ochre 141.....5c. to 25
117 " Silver Ore 94.....1 00 to 10 00
176 " Zinc Ore 135.....5c. to 10 00
61 Redruthite 52. .....5c. to 5 00
715 Refracting Spar, Doubly.5c.to10 00
412 A. Refdanskite 803.....
Reinite Ap. 3-102.....
393 A. Reissite Ap. 1-14..... 75
748 Remingtonite 711.....
399 Rensselaerite 451.....5c. to 50
346 A. Resanite Ap. 2-48.....
232 Resin Opal 198.....10c. to 1 00
798 " Mineral 739..... 50
422 Restomolite Ap. 3-13..... 75
411 Retinalite 464..... 25
825 Retinellite 748..... 25
810 Reussinite 741.....25c. to 50
577 Rhagite Ap. 2-48..... 75
598 Rhodizite 596..... 1 50
448 Rhodochrome 496.....5c. to 1 00
722 Rhodocrosite 691.....5c. to 3 50
241 Rhodonite 2 5.....5c. to 10 00
448 Rhodophyllite 496.....25c. to 1 50
324 Rhoetizite 375.....25c. to 1 00
716 Rhomb Spar 682.....5c. to 2 00
316 Rhyacolite 355.....25c. to 50
231 Ribbon Jasper 195.....15c. to 75
247 Richterite 234.....25c. to 1 00
Rinkite Sm. '84.....
125 Rionite Ap. 1-14.....
450 Ripidolite 497.....5c. to 3 50
116 Rittingerite 94..... 2 00
507 A. Rivotite Ap. 2-48..... 1 00
811 Rochlederite 744.....
Rock Cork Ap. 3-94...25c. to 1 00
231 " Crystal 193.....5c. to 25 00
654 " Gypsum 638.....5c. to 1 00
715 " Milk 680.....25c. to 1 25
138 " Salt 112 .....10c. to 1 00
419 " Soap 473.....10c. to 50
682 Rœmerite 655.....10c. to 2 00
261 A. Rœpperite Ap.1-13.25c.to 5 00
523 Rœsslerite 555.....
Rogersite Ap. 3-104...15c. to 1 50
503 Romeite 547..... .... 1 00
Roscoelite Ap. 3-104..1 00 to 5 00
231 Rose Quartz 193.....5c. to 2 00
526 A. Roselite 560.....1 50 to 5 00
Rosenbuschite A.J.S. 35-417
101 Rosite 85..... 50
807 A. Rosthornite Ap. 1-14..... 75
416 Röttisite 471.....75c. to 1 50
289 Rubellan 307.....25c. to 75
320 Rubellite 367.....10c. to 10 00
56 Ruby Color'd Blende 48.15c.to 1 50
183 " Spinel 147.....10c. to 5 00
179 " Oriental 138.....5c. to 5 00
117 " Blende 94.....25c. to 15 00
118 " Silver 94, 96.....50c. to 15 00
486 Rutherfordite 526.....
193 Rutile 159.....5c. to 10 00
193 " Eisen Rose 159..25c.to 2 00
312 Saccharite 345.....25c. to 1 00
715 Saccharoidal Limestone..5c. to 25
193 Sagenite 159.....25c. to 1 50
238 Sahlite 215.....15c. to 1 00
139 Sal Ammoniac 114.....50c. to 1 50
138 Salt, Common 112.....5c. to 2 00
661 " Epsom 643.....10c. to 50
653 " Glaubers 636.....25c. to 1 50
590 Saltpetre 592..... 50
591 " Chili 592.....5c. to 25
829 A. Salts of Iron, Organic 750
478 Samarskite 520.....10c. to 5 00
204 Sammetblende 170.....25c. to 1 50
421 Samoite 478..... 75
231 Sandstone 195.....5c. to 25
316 Sanidin 355..... 50
417 Saponite 472.....15c. to 50
179 Sapphire 138.....5c. to 5 00
320 " Brazilian 367..25c. to 5 00
231 " Quartz 193.....10c. to 1 00
335 Sapphirine 391.....50c. to 1 00
296 Sarcolite 317.....15c. to 1 00
231 Sard 194 . . ..15c. to 1 00
231 Sardonyx 195.....15c. to 1 00
Sarkinite Sm. '85.....
105 Sartorite 87..... 3 00
398 Saspachite 447.....
594 Sassolite 594.....5c. to 50
654 Satin Spar 638.....10c. to 5 00
715 " 678.....25c. to 5 00
280 Saussurite 290..... 50
378 Savite 426..... 50
376 A. Scarbröite 421..... 75
299 Scapolite 319.....5c. to 5 00
614 Scheelite 605.....25c. to 2 00
772 Scheererite 727..... 75
247 C. Schefferite 242.....25c. to 1 00
715 Schieffer Spath 678.....25c. to 2 50
412 Schiller-spar 469.....15c. to 50
112 B. Schirmerite Ap. 2-50..... 1 50
812 Schlanite 745.....
Schneebergite Sm. '82..... 5 00
343 Schneiderite 399..... 50
320 Schörl 365.....5c. to 2 00
334 Schorlomite 390.....10c. to 1 50
231 Scotch Pebble 194.. .....5c. to 5 00
Schraufite Ap. 3-107..... 1 25
74 Schreibersite 61..... 75
98 Schrift Tellur 81.....25c. to 5 00
755 Schröckeringite Ap. 2-50.....
376 Schrötterite 421..... 75
152 Schwartzembergite 120..... 1 00
125 Schwatzite 101.....50c. to 5 00
630 Schwerspath 617.....5c. to 5 00
Schwefel, see Sulphur or Sulphide
75 Schwefelkies 62.....25c. to 3 50
808 Scleretinite 744.....
379 Scolecite 428.....25c. to 2 00
553 Scorodite 574.....25c. to 1 25
276 Scorza 282..... 50
654 Selenite 638.....5c. to 2 50
65 Selenmercur 56.....75c. to 2 00
23 Selensulphur 21.....25c. to 1 00
163 B. Sellaite Ap. 1-14..... 2 50
463 Selwynite 509..... 1 50
329 Semelene 384.....15c. to 1 00
232 Semiopal 199.....5c. to 2 00
Semseyite Sm. '82.....
270 Senarmontite 184.....25c. to 5 00
767 Seneca Oil 723.....15c. to 50
402 Sepiolite 456.....25c. to 1 00
430 A. Sericite 487.....25c. to 50
411 Serpentine 464.....5c. to 1 00
411 " Fibrous 465..5c. to 1 00
411 " Foliated 465.15c.to 1 00
411 " Precious 464.25c.to 1 50
Serpierite Sm. '82.....
783 Settling Stones Resin 735....
420 Severite 476 and 460..... 1 00
461 Seybertite 508.....15c. to 50
715 Shell Marble 679.....15c. to 3 00
320 Shorl 365 .....5c. to 2 00
Siderazot Ap. 3-109.....
721 Siderite 688.....5c. to 5 00
Sideronatrite Ap. 3-109.....
Siderophyllite Ap.3-80..50c.to 2 00
456 A. Sideroschisolite 504..... 1 00
721 Sideroplesite 688..... 75
721 Siderose 688.....5c. to 5 00
Siegburgite Ap. 2-51...15c. to 25
81 Siegenite 68, 69.....25c. to 2 00
231 Silex 189.....5c. to 25 00
346 Silicate of Copper 402..10c.to 2 50
416 " Nickel 471...5c. to 2 00
" Yttria 804.....
361 " Zinc 407.....5c. to 5 00
231 Silicified Coral.....10c. to 1 50
231 " Nuts.....1 00 to 3 00
231 " Shells 196.....25c. to 3 00
231 " Wood 196.....5c. to 5 00
232 Silicious Sinter 199.....50c. to 1 00
311 Silicite 341..... 50
323 Sillimanite 374.....5c. to 50
Silber, see Silver.....
2 Silver 9.....10c. to 15 00
35 " Antimonial 35...25c. to 5 00
117 " " Sulphuret 95.25c.to 15 00
35 " Arsenical 36..... 2 00
118 " " Ore 96..... 50c. to 10 00
130 " Brittle 106.....50c. to 2 50
142 " Bromic 116.....1 00 to 5 00
140 " Chloride 114.....10c. to 5 00
141 " Chlorbromide 115..10c.to 5 00
40 " Glance 38.....25c. to 15 00
140 " Horn 114.....50c. to 2 00
143 " Iodic 117.....2 50 to 10 00
44 " Ore 41..... 5c. to 1 00
117 " Red, Ruby, Dark 94.25cto15 00
118 " " " Light 96.50c.to10 00
40 " Vitreous 38.....25c. to 15 00
659 A. Simonyite Ap. 1-14..... 50
420 A. Sinopite 477.....
Sipylite Ap. 3-110.....1 00 to 2 00
458 Sismondine 595..... 1 00
307 Skolopsite 333 ..... 1 00
84 Skutterudite 71..... 1 00
715 Slate Spar 678.....25c. to 2 50
Slickensides.....25c. to 1 50
397 Sloanite 446.....
551 Smalt Naturliche 572...5c. to 2 50
83 Smaltite 70.....25c. to 1 00
254 Smaragd 245.....50c. to 5 00
247 Smaragdite 235.....15c. to 1 00
153 Smaragdocalcit 121...15c. to 2 00
405 Smectite 458.....25c. to 1 00
419 Smelite 473..... 50
723 Smithonite 692.....15c. to 2 50
231 Smoky Quartz 193.....5c. to 25 00
295 A. Snarumite 316..... 75
417 Soapstone 472.....5c. to 50
599 Soda Borate 597.....5c. to 1 00
736 " Carbonate 705...25c. to 5 00
138 " Muriate 112.....5c. to 2 50
653 " Sulphate 636.....25c. to 3 50
" Sulphato-Carbonate Sm. '85 25c. to 10 00
315 " Feldspar 348.....5c. to 5 00
591 " Nitre 592.....5c. to 25
305 Sodalite 330.....15c. to 1 00
138 Sodium Chloride 112...5c. to 2 50
831 Soft Coal 755.....5c. to 25
492 D. Sombrerite 535..... 1 00
274 Somervillite 280..... 1 00
252 Sordavalite 244.....50c. to 1 00
350 Spadaite 405.....
124 Spaniolite 101..... 1 00
716 Spar Brown 681.....10c. to 1 00
715 " Calc 670.....5c. to 5 00
632 " Cube 621.....15c. to 1 00
715 " Dogtooth 670.....50c. to 5 00
715 " Doubly Refracting 5c.to 10 00
316 " Feld 352.....5c. to 10 00
654 " Fibrous 637.....5c. to 5 00

159 Spar Fluor 1.3.....5c. to 10 00
630 " Heavy 616.....5c. to 5 00
715 " Iceland 677.....5c. to 10 00
241 " Manganese 225...5c. to 2 00
715 " Nailhead 670.....10c. to 3 00
716 " Pearl 682.....5c. to 1 50
654 " Satin 637.....10c. to 5 00
412 " Schiller 469..... 25
257 " Tabular 210.....5c. to 5 00
715 Spartaite 678..... 25
176 Spartalite 135.....5c. to 10 00
83 A.Spathiopyrite, Ap. 2–52..... 1 00
741 Spathic Iron 688.....5c. to 5 00
90 Spear Pyrites 75.....25c. to 1 25
399 Speckstein 453.....10c. to 50
180 Specular Iron 140.....5c. to 5 00
Sperrylite A.J.S. 37–67.....
239 Spessartite 268..... 75
Sphaerocobaltite Ap.3–111...
575 Sphaerite 587.....
721 Sphaerosiderite 689....15c. to 75
392 Sphaerostilbite 442..... 50
56 Sphalerite 48.....5c. to 5 00
329 Sphene 383.....5c. to 5 00
275 Sphenoclase 280.....
316 Spherulite 359.....5c. to 75
404 A.Sphragidite 458..... 1 00
183 Spinel 147.....5c. to 5 00
185 " Green 149.....10c. to 5 00
184 " Iron 148.....10c. to 1 50
183 " Ruby 147.....10c. to 5 00
185 " Zinc 149.....5c. to 5 00
Spodiosite Ap. 3–112.....
243 Spodumene 228.....5c. to 5 00
724 Sprudelstein 694..... 50
490 C.Staffelite 534.....25c. to 2 00
715 Stalactite 679.....15c. to 1 50
715 Stalagmite 679.....10c. to 1 00
815 Stanekite 745.....
325 Stangenstein 376.....25c. to 1 00
80 Stannite 68.....25c. to 1 00
179 Star Sapphire 138.....50c. to 5 00
231 " Stone 193.....25c. to 3 00
364 " " Green 412....5c. to 5 00
597 Stassfurthite 535.....25c. to 1 00
333 Staurolite 388.....5c. to 1 00
399 Steatite 451.....10c. to 50
Steelite Ap. 3–83.....1 50 to 3 00
44 Steinmannite 41..... 75
339 Stellite 396.....50c. to 1 00
130 Stephanite 106.....50c. to 5 00
515 Stercorite 551.....
63 Sternbergite 54..... 1 50
Stevensite.....5c. to 1 50
228 Stibiconite 188.....25c. to 1 50
587 Stibioferrite Ap. 2–53..... 2 50
29 Stibnite 29.....5c. to 25 00
392 Stilbite 442.....5c. to 5 00
407 Stilpnomelane 460.....10c. to 1 50
204 Stilpnosiderite 170.....50c. to 1 00
630 Stinkstone 616.....5c. to 1 00
405 Stolpenite 459..... 1 00
616 Stolzite 606.....50c. to 5 00
316 A.Stone, Amazon Ap.3–80.5cto25 00
306 " Armenian 331..5c. to 3 50
492 " Asparagus 530..50c. to 1 50
231 " Blood 194.....5c. to 2 00
269 " Cinnamon 266..10c. to 2 50
322 " Cross 371.....10c. to 2 00
715 " Gibraltar 680...10. to 1 00
715 " Lime 678.....5c. to 25
715 " Lithographic679.5c.to 5 00
231 " Lydian 195.....5c. to 1 00
231 " Mocha 195.....5c. to 1 50
715 " Pea 679.....15c. to 1 00
654 " Plaster 637.....5c. to 1 00
715 " Pudding 679....5c. to 25
399 " Soap 452.....5c. to 50
630 " Stink 616.....5c. to 1 00
192 " Tin 157.....5c. to 5 00
247 Strahlstein 234.....10c. to 50
355 Strakonitzite 406.....
241 Stratopeite 227..... 1 00
192 Stream Tin 158.....5c. to 1 25
Strengite Ap. 3–116....25c. to 3 00
454 A. Strigovite Ap. 2–53..... 75
231 Striped Jasper 195.....5c. to 1 00
62 Stromeyrite 54.....50c. to 5 00
728 Strontianite 699.....10c. to 1 50
631 Strontia Sulphate 619...5c. to 5 00
516 Struvite 551.....25c. to 1 75
438 Stübelite 492.....
Stuvenite A. J. S. 33–80.....
120 Stylotypite 98..... 1 00
685 Stypticite 656.....1 00 to 1 50
824 Succinellite 748.....
799 Succinite 740.....5c. to 2 00
625 Sulphatite 614.....
Sulphohalite A. J. S. 36–463.. 1 00
22 Sulphur, Native 20.....5c. to 5 00
23 " Selenic 21....25c. to 1 00
316 Sunstone 355.....10c. to 2 00
638 Susannite 626.....2 00 to 10 00
595 A. Sussexite Ap. 1–15..25c. to 2 00
584 Svanbergite 590..... 1 00
53 Syepoorite 47.....
98 Sylvanite 81.....25c. to 5 00
137 Sylvite 111.....25c. to 1 00
525 Symplesite 558.....
Synadelphite Sm. '84.....
656 A.Syngenite Ap.2–54..25c. to 1 50
247 Syntagmatite 235, 239.....
Szaboite Ap. 3–118..... 50
595 Szaibelyite 594..... 75
Szmikite Ap. 3–118.....
445 Tabergite 493.....
237 Tabular Spar 210.....5c. to 5 00
148 Tachhydrite 119..... 75
253 Tachylyte 245..... 75
272 C. Tachyaphaltite 275..... 50
541 Tagilite 565..... 1 50
399 Talc 451.....5c. to 50
490 F. Talc-apatite 535..... 1 00
400 A. Talcoid 454.....
Talcosite Ap. 1–15..... 1 00
153 A. Tallingite 122..... 50
Tammite Ap. 2–55.....
102 Tannenite 86..... 1 50
230 A. Tantalic Ochre 188.....
473 Tantalite 514.....50c. to 3 00
Tapalpite Ap. 2–55.....
475 Tapiolite 518..... 1 50
724 Tarnovitcite 694..... 75
817 Tasmanite 746..... 50
662 Tauriscite 644..... 75
566 Tavistockite 582.....
626 Taylorite 614.....
662 A.Tecticite 644..... 1 00
230 Tellurite 188..... 1 50
31 Telluric Bismuth 30...50c. to 1 50
58 Telluric Silver 50.....50c. to 5 00
21 Tellurium 19.....1 00 to 5 00
99 " Foliated 82..1 00 to 5 00
98 " Graphic 81...25c.to 5 00
746 Tengerite 710.....
127 Tennantite 104.....50c. to 1 00
178 Tenorite 136..... 25c. to 1 00
232 Tephroite 259.....15c. to 75
418 A.Teratolite 473..... 50
404 A.Terra Sigillata 458..10c. to 50
735 Teschemacherite 705..... 50
370 Tesselite 416..... 1 00
31 Tetradymite 30.....25c. to 5 00
125 Tetrahedrite 100.....10c. to 5 00
498 Tetraphylline 541..... 50
747 Texasite 710.....15c. to 1 50
276 Thallite 282..... 50
716 Tharandite 682.....25c. to 1 00
Thaumasite Ap. 3–120.....
629 Thenardite 615.....10c. to 5 00
737 Thermonatrite 705..... 1 00
411 C.8 Thermophyllite 465..... 1 00
757 Thierschite 718.....
169 Thomsenolite 129.....50c. to 1 50
377 Thomsonite 424.....10c. to 2 50
721 Thoneisenstein 688.....5c. to 25
366 Thorite 413.....75c. to 3 50
534 Thrombolite 562..... 1 00
280 Thulite 290.....15c. to 2 50
460 Thuringite 507..... 1 00
65 Tiemannite 56.....75c. to 2 00
172 Tile Ore 134.....15c. to 50
16 Tin, Native 17.....
192 " Oxyd 157.....5c. to 5 00
80 " Pyrites 68.....25c. to 1 00
192 " Stone 157.....5c. to 2 50
83 " White Cobalt 70..25c. to 2 00
329 Titanite 383.....5c. to 5 00
193, 198 Titanic Acid 160,164..5c.to 5 00
181 Titanic Iron 143.....5c. to 2 00
Titanomorphite Ap. 3–122...
192 Toad's Eye Tin 158...1 00 to 3 00
Tocornalite Ap. 2–56.....
789 Tuluole 737.....
86 Tombazite 72..... 75
325 Topaz 376.....10c. to 5 00
231 " False 193.....10c. to 3 00
179 " Oriental 138.....2 00 to 10 00
269 E. Topazolite 269.....50c. to 1 50
804 Torbanite 742.....10c. to 50
572 Torbernite 585.....10c. to 5 00
474 Torrelite 515..... 50
231 Touchstone 195.....10c. to 1 00
320 Tourmaline 365.....5c. to 5 00
320 " Black 367.....5c. to 3 00
320 " Blue 367.....15c. to 3 00
320 " Brown 367.....5c.to 5 00
320 " Columnar 367.15c.to 1 00
320 " Fibrous 367...10c. to 50
320 " Green 367.....15c. to 5 00
320 " Iron 367.....5c. to 3 00
320 " Lithia 367.....25c. to 5 00
320 " Magnesia 367.10c. to 1 00
320 " Red 367.....25c. to 5 00
78 Towanite 65..... 1 00
316 Trachyte 359.....10c. to 50
335 A. Trautwinite Ap. 2–56.....
353 Traversellite 406..... 1 00
715 Travertine 680.....5c. to 1 00
247 Tremolite 233.....5c. to 1 00
533 Trichalcite 562.....
Trichite 805.....
231 A. Tridymite 805.....15c. to 2 50
817 A. Trinkerite Ap. 1–16..... 50
498 Triphylite 541.....50c. to 1 50
499 Triplite 543.....15c. to 1 00
Triploidite Ap. 3–125..50c. to 1 50
232 Tripolite 199.....5c. to 50
Trippkeite Ap. 3–125.....
365 Tritomite 412..... 2 00
632 Tripe Stone 621..... 50
573 B. Trögerite Ap.1–16..1 00 to 2 50
67 Troilite 57..... 1 00
555 Trolleite 577..... 75
738 Trona 706.....25c. to 5 00
266 Troostite 262.....10c. to 5 00
332 Tscheffkinite 387..... 1 50
314 A. Tschermakite Ap. 2–57... 50
673 Tschermigite 651..... 1 00
419 Tuesite 474..... 50
715 Tufa Calcareous 680.....5c. to 1 00
610 Tungsate of Iron 601..10c. to 2 50
614 " Lime 605.25c. to 5 00
616 " Lead 606..5 c. to 5 00
225 Tungstite 186.....
202 Turgite 167.....10c. to 1 00
497 Turnerite 540.....1 00 to 7 50
563 Turquois 580.....5c. to 5 00
483 Tyrite 524..... 1 00
546 Tyrolite 570.....25c. to 1 50
Tysonite Ap. 3–126..... 5 00
363 A. Uigite 412.....
Uintahite Sm. '85.....5c. to 1 00
602 Ulexite 598.....5c. to 50
87 Ullmannite 73.....25c. to 1 00
306 Ultramarine 331.....5c. to 5 00
408 Unghwarite 461..... 1 00
710 Uraconite 668.....25c. to 2 00
238 Uralite 222..... 50
278 Uralorthite 286..... 2 00
573 Uranglimmer 586.....10c. to 1 50
190 Uraninite 154.....25c. to 2 00
572 Uranite 585.....10c. to 5 00
190 Uranium Oxyd 154....25c. to 2 00
572, 573 " Phosphate 585,586.10cto5 00
572 Uran Mica 585.....10c. to 1 50
Uranocerite Ap. 3–127.....
706 Uranochalcite 667..... 1 50
710 Uranochre 668.....25c. to 2 00
376 B. (?) Uranophane 805..... 1 00
573 C. Uranospinite Ap. 2–58..... 75
Uranotil Ap. 1–16.....10c. to 5 00
496 Urdite 539..... 1 00
778 Urpethite 731.....
Utahite Sm. '84.....
445 D.Vaalite Ap. 2–58.....
Valaite 805..... 50
316 Valencianite 355.....50c. to 5 00
221 Valentinite 184.....50c. to 2 50
621, 620 A.Vanadate of Pb..5c. to 15 00
622 A. " of Ca. & Cu. 612
623 A. " of ? 612.....
621 Vanadinite 610.....5c. to 15 00

622 B. Vanadiolite Ap. 1–16.....
Vanuxemite Ap. 3–128..25c. to 1 50
49 Variegated Copper 44..5c. to 5 00
316 Variolyte 359..... 1 00
555 A. Variscite 582.....5c. to 2 50
644 Vauquelinite 630..... 3 50
411 Verd-antique 465.....25c. to 1 00
445 A. Vermiculite 493.....5c. to 1 00
64 Vermilion 56.....10c. to 5 00
153 Vesbine Ap. 3–129.....25c. to 2 00
Vestan 806.....
273 Vesuvianite 276.....5c. to 5 00
541 A. Veszelyite Ap. 2–59.....
234 A. Victorite Ap. 2–18.....
362 Villarsite 409.....50c. to 2 00
238 B. Violan 223..... 1 50
Viridite Ap. 2–59.....
61 Vitreous Copper 52.....10c. to 5 00
40 " Silver 38.....25c. to 15 00
669 Vitriol, Blue 648.....25c. to 2 00
664 " Green 646.....25c. to 1 00
633 " Lead 622.....25c. to 5 00
524 Vivianite 556.....5c. to 5 00
709 Voglianite 668.....
755 Voglite 717..... 1 00
428 Voigtite 486..... 75
622 Volborthite 611..... 3 00
316 Volcanic Glass 359.....5c. to 1 50
238 Volcanite 213.....50c. to 1 00
229 Volgerite 188..... 1 00
675 Voltaite 652..... 50
57 Volzite 50..... 1 00
311 Vosgite 343..... 1 00
632 Vulpinite 621..... 50
218 Wad 181.....5c. to 50
495 Wagnerite 538..... 5 00
800 Walchowite 741..... 1 00
247 A. Waldheimite 242.....
573 A. Walpurgite Ap. 1–16..... 1 50
520 C. Wapplerite Ap. 2–60..... 75
701 Warringtonite 664..... 1 50
606 Warwickite 600.....15c. to 1 50
181 Washingtonite 144.....25c. to 1 50
175 Water 135.....
Wattevillite Ap. 3–131.....
554 Wavellite 575.....5c. to 5 00
232 Wax Opal 198.....25c. to 75
Webskyite A. J. S. 34–72.....
688 Websterite 658..... 75
33 Wehrlite 32..... 1 00
316 Weissigite 356..... 75
426 Weissite 485..... 75
299 Wernerite 319.....5c. to 5 00
Werthemanite Ap. 3–131.....
323 A. Westanite Ap. 1–16.....
813 B. Wheelerite Ap. 2–60.....
119 Wheel Ore 96.....10c. to 5 00
231 Whetstone 193.....5c. to 25
756 Whewellite 718..... 50
221 White Antimony 184.25c. to 2 00
309 " Garnet 334.....25c. to 2 00
729 " Lead Ore 700.....10c. to 5 00
90 " Pyrites 75.....10c. to 5 00
39 Whitneyite 37..... 5 00
250 Wichtisite 244..... 50
459 B. Willcoxite Ap. 2–61..... 1 00
266 Willemite 262.....5c. to 5 00
411 Williamsite 465.....5c. to 1 00
422 Wilsonite 480.....10c. to 1 00
526 C. Winklerite Ap. 2–61.....
601 A. Winkworthite Ap. 1–17.50c. to 1 00
490 Wiserin 528.....1 50 to 5 00
Wismuth, see Bismuth.....
276 Withamite 282..... 1 00
726 Witherite 697.....5c. to 5 00
121 Wittichenite 98..... 1 00
255 Wöhlerite 261..... 1 00
462 Wolchonskoite 509..... 2 00
92 A. Wolfachite Ap. 1–17..... 75
610 Wolframite 601.....10c. to 2 50
237 Wollastonite 210.....5c. to 5 00
830 E. Wollongongite Ap. 1–17.. 1 00
204 Wood Ore 169.....10c. to 3 00
536 " " Cu Arsenate 564.75c. to 2 50
231 " Petrified 196.....5c. to 5 00
232 " -Opal 199.....10c. to 1 00
231 " Agatized 195.....5c. to 5 00
204 " Iron 169.....5c. to 3 50
231 " Jasperized 196.25c. to 5 00
247 " Mountain 234..25c. to 1 00
232 " Opalized 199...10c. to 1 00
231 " Silicified 196.....5c. to 5 00
192 Wood Tin 157.....15c. to 3 00
704 Woodwardite 666.....25c. to 1 50
617 Wulfenite 607.....5c. to 25 00
101 Wolfsbergite 85.....1 50 to 3 00
70 Wurtzite 59..... 1 50
329 Xanthitan 386..... 1 50
273 Xanthite 276.....25c. to 1 50
Xanthoarsenite Sm. '84.....
133 Xanthoconite 108..... 1 50
461 Xanthophyllite 508..... 1 50
247 Xanthosiderite 174....25c. to 1 00
490 Xenotime 528.....50c. to 5 00
340 Xonaltite 397..... 1 50
790 Xylole 737.....
805 Xyloretinite 742.....
359 Xylotile 406..... 75
205 Yellow Ochre 172.....5c. to 25
231 " Quartz 193.....25c. to 1 50
27 " Sulphuret of As. 27.10c. to 5 00
284 Yenite 296.....15c. to 5 00
280 A. Youstone or Yu 292.50c. to 2 00
160 Yttrocerite 125.....75c. to 1 50
477 Yttrotantalite 519.....50c. to 1 50
331 Yttrotitanite 387..... 1 00
747 Zaratite 710.....15c. to 1 50
372 Zeagonite 418..... 1 50
383 Zeolite Cubic 432.....15c. to 3 00
343 " Efflorescing 399.10c. to 1 25
378 " Feather 426.....10c. to 5 00
392 " Foliated 442.....10c. to 5 00
378 " Needle 426.....10c. to 5 00
370 " Pyramidal 415...10c. to 50 00
392 " Radiated 442....10c. to 5 00
550 A. Zepharovichite Ap. 1–17.. 50
572 A. Zeunerite Ap. 2-62.1 00 to 3 00
781 Zietrisikite 733.....
Zincaluminite Sm. '82.....
14 Zinc 17.....
157, 158 Zinc Iodid and Bromid 122
56 Zinc Blende 48.....5c. to 5 00
749 " Bloom 711.....10c. to 1 00
723 " Carbonate 692.....10c. to 1 50
361 " Calamine 407.....5c. to 5 00
176 " Oxide 135.....5c. to 10 00
361 " Silicate 407.....5c. to 5 00
185 " Spinel 149.....10c. to 5 00
176 Zincite 135.....5c. to 10 00
750 A. Zinkazurite 713.....
106 Zinkenite 88.....1 50 to 5 00
634 Zinkosite 624.....
" Zinn, see Tin .....
64 Zinnober 55.....10c. to 5 00
Zinnwaldite Ap. 3–77.50c. to 2 50
708 Zippeite 667..... 75
272 Zircon 272.....5c. to 10 00
280 Zoisite 290.....10c. to 3 50
Zonochlorite (this Catalogue)
46 Zorgite 43.....1 00 to 3 00
112 Zundererz 91.....1 00
Zunyite Sm. '84.....5c. to 1 25
499 Zwieselite 544..... 1 00
315 Zygadite 352..... 75

PARTIAL PRICE LIST OF PSEUDOMORPHS.

The first number is the species number of the first name, and the final number is that of the second name. Dash indicates "pseudomorph after." Thus, the first line is "Gold, pseudomorph after Sylvanite."

1 Gold—Sylvanite 98..... 3 50
2 Silver—Pyrargyrite 117..... 5 00
44 Galenite—Pyromorphite 493 5c. to 1 25
61 Chalcocite—Chalcopyrite 78 25c. to 75
61 " —Siderite 721..... 50
75 Pyrite—Fluorite 159...10c. to 50
78 Chalcopyrite—Siderite 721... 1 00
99 Marcasite—Fluorite 159.5c. to 25
179 Corundum, alterations of..25c. 1 00
180 Hematite—Fluorite 159.10c. to 1 25
180 " —Ilvaite 284..... 1 50
180 " —Siderite 721.25c. to 3 00
188 Franklinite—Calcite 715..... 2 00
192 Cassiterite—Orthoclase 316 15c. to 1 00
193 Rutile—Brookite 198...5c. to 5 00
206 Limonite—Pyroxene 238 (Anomolite).....10c. to 1 50
206 " —Dufrenite 568.10c. to 50
206 " —Breunnerite 718..... 25
206 " —Siderite 721...25c. to 1 50
206 " —Henwoodite...10c. to 15
231 Quartz—Fluorite 159...5c. to 2 50
231 " —Wollastonite 237..... 25
231 " —Pyroxene 238..5c. to 1 50
231 " —Crocidolite 249.5c. to 2 00
231 " —Datolite 327..2 00 to 10 00
231 " —Barite 630.....25c. to 1 50
231 " —Calcite 715.....5c. to 2 00
231 " —Dolomite 716.10c. to 25
231 " —Coral.....5c. to 75
231 " —Shells.....20c. to 1 00
231 " —Wood.....5c. to 5 00
(?) —Wollastonite 237.....5c. to 20
247 Hydrous Anthophyllite—Tremolite 247.....5c. to 25
293 Muscovite—Nephelite 35c.to 2 50
293 " —Andalusite 322.10c.to 50
(?) —Titanite 329.....50c. to 1 50
343 A. Leonhardite—Calcite 35c.to 75
399 Steatite—Pyroxene 238.15c.to 2 00
399 " —Epidote 276.....5c. to 1 00
399 " —Wernerite 299..... 75
401 Cymatolite or Aglaite is Albite and Muscovite, pseudomorph after Spodumene.....15c. to 1 50
410 Celadonite—Pyroxene 238... 75
411 Serpentine—Enstatite 234.25c 1 25
411 Serpentine—Asbestus 247 (Baltimorite).....5c. to 50
411 Serpentine—Chrysolite 259.. 75
411 " —Orthoclase 316..30c.to 1 00
411 " —Calcite 715..... 50
430 Damourite—Cyanite 324..... 1 00
452 Prochlorite—Garnet 269.10c.to 50
524 Vivianite—Belemnite..10c. to 1 00
524 " —Shell.....25c. to 1 50
610 Wolframite—Scheelite 614.25c 3 50
715 Calcite—Hanksite.....25c. to 1 00
715 " —Belemnite....10c. to 50
715 " —Fossil Ivory..... 15
716 Dolomite—Calcite 715.15c. to 2 50
722 Rhodocrosite—Same..... 3 50
729 Cerussite—Galenite 44.25c. to 2 00
751 Malachite—Cuprite 172.5c. to 1 00
751 " —Azurite 752.10c.to 5 00
752 Azurite—Tetrahedrite 125... 2 50
752 " —Azurite 752..10c. to 1 50
Hydrotitanite—Perofskite 10c.to 2 00

MINERALS FOR THE MICROSCOPE.

537 Adamite 565.....10c. to 25
573 Autunite 586.....10c. to 25
752 Azurite 715.....5c. to 25
30 Bismuthinite 30.....10c. to 25
247 Byssolite 234.....5c. to 15
729 Cerussite 700.....5c. to 25
548 Chalcophyllite 571....10c. to 25
560 Childrenite 579.....10c. to 50
64 Cinnabar 55..... .....10c. to 50
172 Cuprite or Chalcotrichi e 133 10c. to 50
526 Erythrite 558.....10c. to 30
185 Gahnite 149.....5c. to 25
Herrengrundite Ap. 3–57.10c.to 35
542 Liroconite 567.....20c. to 50
751 Malachite 713.....5c. to 25
66 Millerite 56.....10c. to 50
Mixite Ap. 3–82.....10c. to 50
536 Olivenite 564.....15c. to 35
232 Opal, with enclosure 198.5c.to 50
558 Pharmacosiderite 578..15c.to 50
624 Pucherite Ap. 2–12.....15c. to 50
117 Pyrargyrite 94.....15c. to 50
493 Pyromorphite, 535.....5c. to 25
56 Ruby Blende 94.....5c. to 20
231 Rutilated Quartz 194.15c. to 50
553 Scorodite 574.....15c. to 50
22 Sulphur 20.....5c. to 25
572 Torbernite 585.....5c. to 50
621 Vanadinite, red, brown, yellow and white 610.....5c. to 50
565 A. Variscite 582.....5c. to 20
524 Vivianite 556.....5c. to 20
554 Wavellite, 575.....5c. to 20
617 Wulfenite 607.....5c. to 25

To Ascertain the Characteristics of any Species.—Look in the "Price List of Species and Varieties" (alphabetically arranged) for the Species No., and by this the Species can be found in its order.

To Determine any Mineral.—Test the hardness with a file, or better, with the minerals in the scale of hardness. It will be found to be one of certain ones found in one of the columns of the Table of Hardness. Then, determining the color, we look in the column of this color in the Table of Color, and find that there are only a few of this hardness in this column; then, determining the crystalline form or Specific Gravity, we eliminate others, bringing it finally down to one or two, which we find in their order in the "Table of Species," and compare their qualities. Take Amethyst as an example. We easily find that its hardness is 7. It must be in the column headed 6½ to 7 or 7–10. Its color is violet or purple, 58. We find that the only number found in columns 6½ to 7 or 7–10, hardness, and column 58, color, is 231. It must, therefore, be a variety of Quartz. As another common mineral, take green fluor spar in cubes. Its hardness is 4, its color 4, its crystallization 1. Its Specific Gravity, 3–3½. 159 is the only mineral combining these qualities.

The following are the abbreviations used in this table:

Specific Gravity ranges from Water, 1, to Iridosmine, 19–21. For collections illustrating sp. gr., hardness, etc., see other pages.

Hardness.—1 Talc; 2 Gypsum; 3 Calcite; 4 Fluorite; 5 Apatite; 6 Feldspar; 7 Quartz; 8 Topaz; 9 Corundum; 10 Diamond.

Composition.—The following are the abbreviations of the elements: Aluminum, Al.; Antimony, Sb.; Arsenic, As.; Barium, Ba.; Beryllium, Be.; Bismuth, Bi.; Boron, Bo.; Bromine, Br.; Cadmium, Cd.; Caesium, Cs.; Calcium, Ca.; Carbor, C.; Cerium, Ce.; Chlorine, Cl.; Chromium, Cr.; Cobalt, Co.; Copper, Cu.; Didymium, D.; Erbium, E.; Fluorine, F; Gold, Au.; Hydrogen, H.; Indium, In.; Iodine, I.; Iridium, Ir.; Iron, Fe.; Lanthenum, La.; Lead, Pb.; Lithium, Li.; Magnesium, Mg.; Manganese, Mn.; Mercurp, Hg.; Molybdenum, Mo.; Nickel, Ni.; Niobium, Nb.; Nitrogen, N.; Osmium, Os.; Oxygen, O.; Palladium, Pd.; Phosphorous, P.; Platinum, Pt.; Potassium, K.; Rhodium, Rh.; Rubidium, Rb.; Ruthenium, Ru.; Selenium, Se.; Silver, Ag.; Silicon, Si.; Sodium, Na.; Strontium, Sr.; Sulphur, S.; Tantalum, Ta.; Tellurium, Te.; Thallium, Tl; Thorium, Th.; Tin, Sn.; Titanium, Ti.; Tungsten, W.; Uranium, U.; Vanadium, V.; Yttrium, Y.; Zinc, Zn.; Zirconium, Zr., ϑ represents the barred C or double element of Dana. Owing to a lack of proper type we have not represented the barring of the other elements. H represents water except in the hydrocarbons.

Dots over letters indicate atoms of O.

Cleavage or Fracture.—A, Cubical; J, Imperfect; G, Earthy; I, Rhombohedral; B, Oct; X, Sectile; C, Granular; D, Bassal; N, Dodecuhedral; E, Prismatic; H, Uneven; Q, Pulverulent; F, Brittle; K, Tough; M, Hackly; P, Rhombic; L, Foliated; R, Malleable. T, Scaly; U, Fibrous; S, Compact; W, Perfect; Y, Hexagonal; Z, Conchoidal; Tr, Tabular; Rad, Radiated; Ct, Distinct; Am, Amorphous; Cry, Concretionary; V, Rectangular; Mi, Micaceous; Cld, Clinodiagonal; =Equal; Res, Resinous.

Fusibility.—(1) Fusible in the flame of a candle (ex.) Stibnite. (2) Fusible in the flame of a candle, in small fragments (ex.) Natrolite. (3) Infusible in the flame of a candle, but easily fusible B. B. even in somewhat large pieces(ex.) Alamandine Garnet. (4) Fusible B. B. in rather fine splinters (ex.) Actinolite. (5) Fusible in finer splinters (ex.) Orthoclase. (6) B. B. becomes rounded only on the finest points and thinest edges (ex.) Bronzite. E, Easily; V, Volatile; D, Difficulty; F, Fusible; S, Sublimes.

Crystallization.—I. Isometric; II. Tetragonal; III. Orthorhombic; IV. Monoclinic; V. Triclinic; VI. Hexagonal, Quartz; M. Massive; F. Fibrous; S. Stalactitic, C. Compact; A. Amorphous; G. Granular; P. Pseudomorphous.

Color and Streak.—1 White; 2 black; 3 red; 4 green; 5 yellow; 6 blue; 7 gray; 8 brown; 9 pink; 10 copper; 21 lead; 12 steel; 13 iron; 14 tin; 15 bronze; 16 brass; 17 purple; 18 pinch-back; 19 pale; 20 velvet; 21 dark; 22 dirty; 23 colorless; 24 sulphur; 24 aurora; 26 lemon; 27 cherry; 29 cochineal; 30 pomegranate; 31 pearl; 32 hyacinth; 33 azure; 34 olive; 35 leek; 36 verdigris; 37 emerald; 38 grass; 39 pistachio; 40 sky; 41 indigo; 42 peach; 43 apple; 44 ochre; 45 honey; 46 straw; 47 ash; 48 flesh; 49 lavender; 50 raven; 51 pitch; 52 wood; 53 rose; 54 sea; 55 hair; 56 orange; 57 brick; 58 violet; 59 wax; 60 snow; 61 liver; 62 oil; 63 clove; 64 milk; 65 asparagus; 66 dull; 67 tile; 68 silver; 69 light(—all colors.)

Lustre.—70 Resinous; 71 Adamantine; 72 Vitreous; 73 Metallic; 74 Shining; 75 Bright; 76 Weak; 77 Earthy; 78 Greasy; 79 Silky; 80 Metalloidal; 81 Splendid; 82 Glassy; 31 Pearly; 66 Dull; 59 Wax; 51 Pitch. Other lustres indicated by the corresponding color number.

I think that the errors in the "Table of Species" are excusable in view of the fact that the great amount of labor in compiling and finishing it came in the Centennial summer.

(*I.*) *Native Elements.*

Species No.	SPECIES.	Page in Dana.	COMPOSITION.	Color.	Streak or Lustre.	Cleavage or Fracture.	Hardness.	Specific Gravity.	Fusibility.	Crystallization.
1	Gold	....3....	Au	....5....	....5....	....	....2.5....	....19.3....	...2.5–3....	..I...
1	A. Maldonite	Ap. 1–10	Au^2 Bi	....9, 1....	....	....A....	....1.5–2....	...8.2–9.7?	....E....	.....
2	Silver	....9....	Ag	....1....	....1....	....	....2.5....	....10.5....	...2–2.5....	..I...
3	Platinum	....10....	Pt (Ir Rh Pd Fe)	....12, 7....	...69, 7....	....	...4–4.5...	...16–19..	.....	..I...
4	Platiniridium	....11....	Fe Cu Os	....1....	....	....	....6–7....	22.6–23..	.....	..I...
5	Palladium	....12....	Pd	....12, 7....	...12, 7....	....	...4.5–5...	....11.5....	.....	..I...
6	Allopalladium	....12....	Pd^3	68, 1 to 12, 7	....75....	...D. W...	.....	.....	.....	VI..
7	Iridosmine	....12....	Ir Os Rd Ru	....14, 1....	....7....	....	....6–7....	19 3–21..	.....	VI..
8	Mercury	....13....	Hg	.....1....	....	....	....	....13.5....	.....	..I...
9	Amalgam	....13....	Ag Hg^2 and Ag Hg^3	....68, 1....	....7....	....	....3....	13.7–21..	....1....	..I...
10	Arquerite	....14....	Ag^6 Hg	....68, 1....	....7....	....R....	....	....10.8....	.....	..I...
10	A. Kongsbergite	Ap. 2–32	Ag_{18} Ag	....	....	....	....	....	.....	.....
11	Gold Amalgam	....14....	$(Au\ Ag)^2$ Hg^5	.....1....	....	....	....	....	.....	.....
12	Copper	....14....	Cu	....10, 3....	...10, 3....	....	....3....	....8.9....	....3....	..I...
13	Iron	....15....	Fe (Ni etc.)	....13, 7....	....	....B....	....4.5....	....7.5....	.....	..I...
14	Zinc	....17....	Zn	..... 1–7....	....1–7....	...D. W...	....2....	....7....	.....	VI..
15	Lead	....17....	Pb	....11, 7....	...11, 7....	....	....1.5....	....11.4....	....1....	..I...
16	Tin	....17....	Cu Fe Sn Zn S	....12, 7....	....2....	....	....4....	....4.4....	....E....	VI..
17	Arsenic	....17....	As	....14, 1....	...14, 1...	....C....	....3.5....	....6....	....V....	VI..
18	Antimony	....18....	Sb	....14, 1....	...14, 1...	....W....	....3.5....	....6.2....	....1....	VI..
19	Allemontite	....18....	Sb As_3	...14, 1, 3, 7..	73, 66, 81	....	....3.5....	....61.3....	....E....	VI..
20	Bismuth	....19....	Bi	..... 3, 1....	.....1....	....D....	....2.5....	....9.7....	....1....	VI..
21	Tellurium	....19....	Te	....14, 1....	...14, 1...	....Y....	...2–2.5...	....6.2....	....1....	VI..
22	Native Sulphur	....20....	S	....24, 5....	....70....	....Z....	...1.5–2.5..	....2....	....E....	III..
23	Selen Sulphur	....21....	Se	....8 or 56....	....70....	....Z....	...1.5–2.5..	....2....	....E....	..M..
24	Diamond	....21....	C	.....— 1....	....71....	....B....	....10....	...3.5–3.6..	.....	..I...
25	Graphite	....24....	C	....13, 2....	.....2....	.....L....	....21.5....	....2....	.....	VI..

(*II.*) *Sulphids, Tellurids, Selenids, Arsenids, Antimonids, Bismuthids.*

Species No.	SPECIES.	Page in Dana.	COMPOSITION.	Color.	Streak or Lustre.	Cleavage or Fracture.	Hardness.	Specific Gravity.	Fusibility.	Crystalliza-tion.
26	Realgar	26	As S	25, 3	70	Z	1.5–2	3.5	E	IV
27	Orpiment	27	As S_3	26, 5	31	L	1.5–2	3.48	E	III
28	Dimorphite	28	As S^3	56, 5	71, 81		1.5	3.58		III
29	Stibnite	29	Sb^4 S_3	11 to 12, 7	11, 7	D	2	4, 5	1	III
29	A. Livingstonite	Ap. 2-35		75, 7	3		2	4.81		
30	Bismuthinite	30	Bi S^3	11, 7	E		2		1	III
31	Tetradymite	30	Bi Te^3 or Bi (Te S Se)^3	12, 7		D	1.5–2	7.5	E	VI
32	Joseite	31	Bi Te S Se	2, 7		D	1.5–2	7.9	E	VI
33	Wehrlite	32	Bi (Te S) with Te	12, 7	75	D. W.	1–2	8.44		VI
33	A. Arsenotellurite	Ap. 2–5	2 Te S_2 As_2 S_3	8						
34	Molybdenite	32	Mo S^2	6, 7	4	L	1–1.5	4.6		IV?
35	Dyscrasite	35	Ag^3 Sb	68, 1	68, 1	D	3.5–4	9.6	1.5	III
36	Chilenite	36	Ag^6 Bi	68, 1		C	soft			A
37	Domeykite	36	Cu^6 As	14, 1	2	F	3.5	7.5	E	M
38	Algodonite	37	Cu^{12} As	12, 7	15	K	4	7.6	E	M
39	Whitneyite	37	Cu^{18} As	15	15	M	3.5	8.3	E	M
40	Argentite	38	Ag S	7, 2	7, 2	R	2.5	7.2	1.5	I
40	C. Polyargyrite	Ap. 1–12	12 Ag S+Sb^2 S^3	13, 2 to 7, 2	7, 3	A	soft			I
41	Naumanite	39	Ag Pb Se	13, 2	2	A	2.5	8	E	I
42	Eucairite	39	(Cu Ag) Se	11, 7	74	C			E	M
43	Crookesite	40	(Cu Tl Ag) Se	11, 7			2.5	6.9	E	M
44	Galenite	40	Pb S	11, 7	7	A	2.5	7.5	1	I
44	A. Huascolite	44	Pb S	11, 7						
44	B. Cuproplumbite	44	Pb S	11, 7						
45	Clausthalite	42	Pb Se	11, 7	7, 2	A	2.5	7–8		I
46	Zorgite	43	(Pb Cu) Se	11, 7	21, 7	C	2.5	7.5	E	M
47	Lehrbachite	44	Pb Hg Se	11, 7	2	C	2	7.8	V	M
48	Altaite	44	Pb Te	14, 1			2	8	E	I
49	Bornite	44	(Cu Fe) S	10, 3, 5, 17	2		3	5	E	I
50	Berzelianite	46	Cu Se	68, 1	74		soft			M
51	Castillite	46	Cu Pb Fe Ag Zn S	10, 3	2	L	3	5.2	E	M
52	Alabandite	46	Mn S	13, 2	4	A	3.5	4	3	I
53	Syepoorite	47	Co S	12, 7				5.45		M
54	Pentlandite	47	Ni Fe S	15, 5	8		3.5–4	4.6	E	I
55	Grünauite	47	Bi Ni Cu Fe S	12, 7	21, 7	B	4 5	5.1	E	I
56	Sphalerite	48	(Zn Fe) S	1, 5, 4, 2, 8	70	N	3.5–4	3.9–4.2		I
56	A. Oldhamite	Ap. 2-42		19, 8			4	2.58		I
57	Voltzite	50	4 Zn S+Zn O	21, 3, 5, 8	72 to 78		4–4.5	3.66–3.81		
58	Hessite	50	Ag Te	11, 7	7	X	2.5–3	8.5	1	III
58	A. Petzite	51	Au Te+3 Ag Te	13, 2	13, 2		2.5	9	E	IV
59	Daleminzite	51	Ag S	7, 2	7, 2	R	2–2.5	7.044		III
60	Acanthite	51	Ag S	13, 2	13, 2	R	2.5	7.2	1.5	III
61	Chalcocite	52	Cu S	12, 7	7	Z	2.5–3	5.7	E	III
62	Stromeyerite	54	(Cu Ag) S	12, 7	7		2.5–3	6.3	E	III
63	Sternbergite	54	Ag Fe S	18, 8	2	D	1–1.5	4.2	E	III
64	Cinnabar	55	Hg S	3	3	W	2.5	8.9	V	V
64	A. Metacinnabarite	Ap. 1–10	Hg S	7, 2	73, 2	H	3	7.70–7.748		A
65	Tiemannite	56	Hg Se	11, 7	2	C	2.5	7.2	E	M
65	A. Onofrite	56	Hg Se+1 Hg S	7, 11, 21	74					A
66	Millerite	56	Ni S	15, 5	75		3–3.5	5.6	E	VI
66	A. Beyrichite	Ap. 1–3	3 Ni S+2 Ni S^2	11, 7	73	W	3–3.5	4.7		VI?
67	Troilite	57	Fe S (or Fe^3 S^3)	8	2		4.0	4.75		M
68	Pyrrhotite	58	6 Fe S+Fe S^2	15, 5	2, 7	D	4	4.5	E	VI
68	A. Chalcopyrrhotite	Ap. 2–11	Cu^4 Cu S^6	8				4.28		M
69	Greenockite	59	Cd S	56 to 45, 5	71	E	3–3.5	4.9		VI
70	Wurtzite	59	Zn S	8, 2	72, 8	V. E	3.5–4	3.98		VI
71	Niccolite	60	Ni^2 As	10, 3	8, 2	H	5–5.5	7.4	E	VI
71	A. Arsenical Cobalt	Ap. 1–1	Co As							
72	Breithauptite	61	Ni^2 Sb	10, 3	3, 8		5.5	7.5	3	VI
72	A. Arite	Ap. 2–5	As Lb Ni				5.5	7.5	F	M
73	Kaneite	61	Mn As	7, 1	73	L. or C	5?	5.55		A
74	Schreibersite	61	P Fe Ni C	12, 7			6.5	7.01–7.22		
75	Pyrite	62	Fe S^2	16, 5	8, 2		6–6.5	4.9	E	I
76	Hauerite	64	Mn S^2	8, 2	8, 3		4	3.46	3	I
77	Cubanite	65	Cu S+Fe S+3 Fe S^2	15, 5	3, 15	A	4	4 1	E	I
78	Chalcopyrite	65	Cu S+Fe S+Fe S^2	16, 5	4, 2	H	3.5	4.3	2	II
79	Barnhardtite	67	2 Cu S+Fe S+Fe S^2	15, 5	7, 2		3.5	4.5	E	M
80	Stannite	68	Cu Fe Sn Zn S	12, 7	2		4	4.4	E	M
81	Linnæite	68	2 (Co Ni) S+Co S^2	12, 7	2, 7		3.5	4.9	E	I
81	A. Horbachite	Ap. 2–28	4 Fe S_3+Ni S_3	18, 8 to 12, 7	2	J	4.5	4.43		M
82	Carrollite	69	2 (Cu Co) S+Co S^2	14, 1	7		5.5	4.85	E	I
83	Smaltite	70	(Co Fe Ni) As	14, 1	7, 2	B	5.5	6.4–7.2	E	I
83	A. Spathiopyrite	Ap. 2–52	Co Fe Cu As S	14, 1			4.5	6 7		III
84	Skutterudite	71	Co^2 As^3	7, 1		B	6	6.7	E	I
85	Cobaltite	71	Co S^2+Co As	1, 3	7, 2	B	5.5	6	E	I
86	Gersdorffite	72	Ni S_2+Ni As_3	1, 7	7, 2		5.5	5.6–6.9	E	I
87	Ullmannite	73	Ni S_2+Ni Sb	12, 7			5.5	6.3	3	I
88	Corynite	74	Ni S^2+Ni (As Sb)	7, 1	2	H	4.5–5	6	E	I
89	Laurite	74	12 Ru^2 S^3+Os S^4	21, 13, 2	75, 73	ct. B	7+	6.99		I

Species No.	SPECIES.	Page in Dana.	COMPOSITION.	Color.	Streak or Lustre.	Cleavage or Fracture.	Hardness.	Specific Gravity.	Fusibility.	Crystalization.
90	Marcasite	75	FeS_2	19, 5 to 1	2, 7		6–6.5	4.7	E	III.
91	Leucopyrite	76	Fe As	68, 1	7, 2		5.5	6.8–8.7	D	III.
92	Rammelsbergite	77	Ni As_2	7, 1	7–2		5.5	7	E	III.
92	A. Wolfachite	Ap. 1–17	Ni S^2+Ni $(As\ Sb)_2$	68, 1	2	73	5.5	6.372		III.
93	Lölingite	77	Fe As S	68, 1	7. 2		5.5	6.8–8.7	D	III.
93	A. Glaucopyrite	Ap. 1–6	S As Sb Fe Co Cu	1?, 7 to 14, 1	7, 3		4.5	7.181		III.
94	Arsenopyrite	78	Fe S_2+Fe As	68, 1	7, 2	H	5.5	6.2	2	III.
95	Glaucodot	80	(Co Fe) S^2+(Co Fe) As	7, 1	2	P	5	6	E	III.
96	Pacite	81	Fe^2+4 Fe As^2	14, 1	73, 2		4–4.5	6.297		III.
97	Alloclasite	81	2 Co S^2+Co As+4 Bi As	12, 7	2	P	4.5	6.6	E	III.
98	Sylvanite	81	(Ag Au) Te^3	12, 7			2	8	E	IV.
98	A. Calaverite	795	Au Te_4	15, 5	5, 7	F. H				M.
99	Nagyagite	82	Pb Au Te S	2, 7	7	D–L	1–1.5	7	E	II.
100	Covellite	83	Cu S	41, 6 to 2		D	1.5–2	4.6		VI.
100	A. Melonite	801	$Ni_2\ Te_3$	3, 1	73, 21, 7	D. Y				
101	Chalcostibite	85	Cu S+Sb S_2	11, 7	2	E	3.5	4.8	I	III.
102	Emplectite	86	Cu S+Bi S^3	14, 1					E	III.
103	Chiviatite	86	2 (Cu Pb) S+3 Bi S^3	11, 7				6.92	1	M.
104	Berthierite	86	Fe S+Sb S_3	12, 7			2–3	4.2	1.5	
105	Sartorite	87	Pb S+As S^3	11, 7	8	D	3	5.3	E	III.
106	Zinkenite	88	Pb S+Sb S_3	11, 7			3–3.5	5.3	I	III.
107	Jordanite	88	Pb As S	11, 7	2	E			E	III.
108	Miargyrite	88	Ag S+Sb S_3	13, 2	27, 3		2.5	5.2	1	IV.
109	Plagionite	89	Pb S Sb	11, 7			2.5	5.4	1	IV.
110	Binnite	90	3 Cu S+As S^3	12, 7	27, 3	F	4.5	4 4	E	I.
111	Brongniardite	90	2 (Pb Ag) S+Sb S_3	2, 7			3	5.9	E	I.
112	Jamesonite	90	2 Pb S+Sb S_3	11, 7		D	2–3	5.6	1	III.
112	A. Cosalite	797	2 Pb S+Bi S_3	11, 7	73	H				
113	Dufrenoysite	92	2 Pb S+As S_3	11, 7	8	D	3	5.5	E	III.
113	A. Diaphorite	Ap. 1–4	S Sb Pb+Ag	12, 7	73	H	2.5–3	5.902		
114	Freieslebenite	93	5 (Pb Ag) S+2 Sb S_3	12, 7	7	E	2–2.5	6–6.4	E	IV.
115	Pyrostilpnite	93	S Sb Ag	32, 3	31, 71	X	2	4.2–4.25	1	IV.
116	Rittingerite	94	S Sb Ag?	56, 5	71, 73	F	1.5–3		E	IV.
117	Pyrargyrite	94	3 Ag S+Sb S_3	21, 3 to 2	71	Z	2.5	5.8	1	VI.
118	Proustite	96	3 Ag S+As S_3	29, 3	71	Z	2.5	5.5	1	VI.
119	Bournonite	96	3 (Cu Pb) S+Sb S_3	12, 7	13, 3		2.5	5.8	1	III.
120	Stylotypite	98	3 (Cu Fe Ag) S+Sb S_3	13, 2	13, 2		3	4.7	1	III.
121	Wittichenite	98	3 Cu S+Bi S^3	12, 7	2		3.5	4.6–5	E	III.
121	A. Klaprotholite	Ap. 1–8	3 Cu S+Bi^2 S^3	12, 7 to 5	73, 2	ct. C	2.5	4.6		
122	Boulangerite	99	3 Pb S+Sb S_3	11, 7			2.5–3	5.9	1	M.
122	A. Epiboulangerite	Ap. 1–5	S Sb Pb	21, 67	73			6.309		III.
122	B. Schirmerite	Ap. 2–50	Pb Ag Bi S	11, 71 to 2	73	H. F	soft		E	M.
123	Kobellite	99	3 Pb S+(Bi Sb) S^3	11, 7			soft	6.3	1	Rad
124	Aikinite	100	3 (Cu Pb) S+Bi S^3	11, 7			2–2.5	67	1	III.
125	Tetrahedrite	100	4 (Cu S)+Lb S_3	11, 7			3.5	4.5–5.1	1.5	I.
126	Polytelite	104	S Sb Pb Ag Fe					5.483		
127	Tennantite	104	4 (Cu Fe) S+As S^3	13, 2	7		3.5–4	4.5	1.5	I.
127	A. Julianite	Ap. 1–8	S As Cu Sb	21, 3, 11	73, 71	F	soft	5.12	E	
128	Meneghinite	105	4 Pb S Sb S_3	11, 7			2.5	6 3	1	IV.
129	Geocronite	105	5 Pb S+(Sb As) S^3	11, 7		C	2–3	6.5	1	III.
130	Stephanite	106	5 Ag S+Sb S^3	13, 2	2		2.5	6.26	1	III.
131	Polybasite	107	9 (Ag Cu) S+Sb) As) S^3	13, 2	13, 2	H	2.3	6.25	E	III.
132	Enargite	107	3 Cu S+As^2 S^5	7, 8, to 13, 2	73, 7	F. H	3	4.43–4.45	E	III.
132	A. Epigenite	Ap. 1–5	Cu Fe As S	12, 7	2	C	3.5		E	III.
132	B. Famatinite	Ap. 2–20	{4 (3 Cu_2 S Sb_2 S_5)+ 3 Cu_2 S As_2 S_5}	10, 3, 7	2	H. F	3.5	4.57	E	M.
133	Xanthoconite	108	Ag As S	30–5	71		2	5–1	E	VI.
134	Clayite	108	S As Sb Pb Cu	2, 11, 7	73, 2, 11, 7	X	2.5			I.
135	Bolivianite	109	8 Ag Sb	11, 7	sub, 73	ct	2.5	4.820		III.

(*III.*) *Compounds of Chlorine, Bromine, Iodine.*

136	Calomel	111	Hg_2 Cl	7–1	71		1.5	6.5	V	II.
137	Sylvite	111	K Cl	23 to 1	72	A	2	1.9–2	E	I.
138	Halite	112	Na Cl	23, 1, 3,	72	A	2.5	2.15	E	I.
138	A. Chlorocalcite	Ap. 2–11	Ca Cl_2+K Na Mn							I.
139	Sal Ammoniac	114	N H_4 Cl	1, 5	72		1.5–2	1.53	V	I.
140	Cerargyrite	114	Ag Cl	31, 7	70, 71		1–1.5	5.5	1	I.
141	Embolite	115	Ag (Cl Br)	4 to 21, 5	71		1–1.5	5.3–5.8	1	I.
142	Bromyrite	116	Ag Br	4–5	71		2–3	5.8–6	1	I.
143	Iodyrite	117	Ag I	26, 5	71	D	1.5	5.7	1	VI.
144	Coccinite	117	Hg I?	3 to 5	71				S	M.
144	A. Bordosite	Ap. 2–8	Ag Cl+Hg_2 Cl	5 to 3						
145	Cotunnite	117	Pb Cl	5–1	71		2	5.2	E	III.
146	Molysite	118	Fe^2 Cl^3	8, 3, 5						M.
146	A. Nantokite	Ap. 1–11	Cu_2 Cl	1						
147	Carnallite	118	K Cl+2Mg Cl+12 H	64, 1	74, 78	Z			E	M.
148	Tachhydrite	119	(Ca Mg) Cl+4 H	5			2 ct		E	M.

Species No.	SPECIES.	Page in Dana.	COMPOSITION.	Color.	Streak or Lustre.	Cleavage or Fracture.	Hardness.	Specific Gravity	Fusibility	Crystalization.
148	A. Erythrosiderite	Ap. 2–19	$2\,KCl+Fe_2Cl_3+2\,H$	3					S	III.
149	Kremersite	119	$KCl+AmCl+Fe^2Cl^3+3H$	3			soft		S	I.
150	Matlockite	119	$PbCl+Pb$	4 to 5, 1	31	D. J	3	7.2	E	II.
151	Mendipite	120	$PbCl+2\,Pb$	23–1	31	E	2.5	7–7.1	E	III.
152	Schwartzembergite	120	$PbI+2\,PbO$	45, 5	71	F	2–2.5	5 7	E	VI.
153	Atacamite	121	$3\,\dot{C}u\,\dot{H}+Cu\,Cl\,\dot{H}$	35, 2, 37–4	72	E	3.5	4.25	F	III.
153	A. Tallingite	122	$4\,\dot{C}u\,\dot{H}+Cu\,Cl\,\dot{H}$	6–4			3	3.5 (?)	F	M.
154	Percylite [um	122	$PbCu\,Cl\,O\,H$	40–6			2.5			I.
155	Chloride of Magnesi-	122	$MgCl$							
156	Cloride of Manganese	122	$MnCl_2$							
157	Iodid of Zinc		ZnI_2							
158	Bromid of Zinc		$ZnBr$							

(*IV.*) *Fluorine Compounds.*

159	Fluorite	123	$CaFl$	—	72	B	4	3.18	3	I.
160	Yttrocerite	125	$(Ca\,Ce\,Y)\,Fl$	1–7–6	19, 72		4.5	3.45		M.
161	Fluocerite	126	$Ce\,Fl+Ce^2\,Fl^3$	5–67–3	76		4 5	4.7		VI.
162	Fluocerine	126	$Ce^2\,F^3+3\,(C^2\,O^3+H)$	5, 3	72 or 70,5		4.5–5			I.
163	Fluellite	126	$Al\,Fl$	1	72					III.
163	A. Ralstonite	Ap. 1–13	$Al\,Ca\,Mg\,Fl\,H$	23, 1	72		4.5	2.5		I.
163	B. Sellaite	Ap. 1–14	$MgFl?$	23	72	W. Z	5	2.972		II.
164	Cryolite	126	$3\,NaFl+Al^2\,Fl^3$	1–2	72	D. W	2.5	3	1	III?
165	Arksutite	128	$2\,(Ca\,Na)\,Fl+Al_2\,Fl^3$	1	72		2.5	3.1	E	M.
166	Chiolite	128	$3\,NaFl+2\,Al^2\,Fl^3$	60–1			4	2 72	1	II.
167	Chodneffite	128	$2\,NaFl+Al^2\,Fl^3\,[2\,H$	1			4	3	E	II.
168	Pachnolite	129	$3\,(Ca\,Na)\,Fl+Al^2\,Fl^3+$	23–1	72		2.5–4	2.75	E	IV.
169	Thomsenolite	129	$2\,(Ca\,Na)\,F+Al^2\,F^3+2\,H$	1, 3	72, 31	D. W	2.5–4	2.74	E	IV.
169	A. Hagemannite	130	$F\,Si\,Al\,Fe\,Mg\,Ca\,Na$	44, 5	74		3–3.5	2.59	E	
170	Gearksutite	130	$2\,CaFl+Al^2\,Fl^3+4\,H$	1	92		2		E	
171	Prosopite	130	$SiFAlCaH$		23, 1, 7		4.5	2.890		IV.

(*V.*) *Oxygen Compounds.*

172	Cuprite	133	$Cu\,O$	29–3	77, 71	B	3.5–4	6	E	I.
173	Periclasite	134	$Mg\,Fe$	7 to 21, 4			6	3.674		I.
174	Bunsenite	134	$Ni\,O$	39, 4	72, 8, 2		5.5	6.398		I.
175	Water	135	$H_2\,O$	23				0.918		VI.
176	Zincite	135	$Zn\,O$	56, 5, 3	sub. 71	D. C. F	4–4.5	5.43–5.7		VI.
177	Massicot	136	$Pb\,O$	5	66		2	8		III.
178	Melaconite	136	$Cu\,O$	2 to 8, 2	73 to 77		3	5.95	D	I.
178	A. Delafossite	Ap. 2–16	$Cu\,O\,Fe_2\,O_3\,Al_2\,O_3?$	21, 7	2, 7, 73		2.5	5.07		
179	Corundum	137	$Al_2\,O_3$	1, 7, 6 & —	72	I	9	4		VI.
180	Hematite	140	$Fe_2\,O_3$	12, 7 to 2	3	T. U. S.	5.5–6.5	5		VI.
180	A. Martite	142	$Fe_2\,O_3$	13, 2	sub. 73		6–7	4.809		I.
181	Menaccanite	143	$(Ti\,Fe)_2\,O^3$	2	2		5–6			VI.
181	A. Iserite	145	$Fe\,O\,Ti\,O_2+Fe\,O_3$					4.817		I.
182	Perofskite	146	$Ca\,O\,Ti\,O_2$	13, 2 to 5	7		5.5	4.03		I.
183	Spinel	147	$(Mg\,O\,Fe\,O)\,(Al_2\,O_3\,Fe_2\,O_3)$	2, 6, 8, 5, 4 & 2	72	Z	8	3.5–4.1		I.
184	Hercynite	148	$Fe\,O\,Al_2\,O_3$	2	72, 4	72, 4	7 5–8	3 91		I.
185	Gahnite	149	$(Zn\,O\,Mg\,O)\,(Al_2\,O_3\,Fe_2\,O_3)$	4–2	7, 92, 78		7.5–8	4–4.5		I.
185	A. Dimagnetite	151	$Fe\,O\,Fe_2\,O_3$						6	
186	Magnetite	149	$Fe\,O\,Fe_2\,O_3$	13–2	2	B	5.5–6.5	4.9–5.2	5	I.
187	Magnesioferrite	152	$Mg\,O\,Fe_2\,O_3$	2	2		6–6.5	4.5–4.6		I.
188	Franklinite	152	$(\dot{Z}n, \dot{M}n, \dot{F}e)\,(\dddot{M}n\ \dddot{F}e)$	13–2	3, 8		5.5–6.5	5.1		I.
188	A. Jacobsite	Ap. 1–8	$(\dot{M}n\ \dot{M}g)\,(\dddot{M}n, \dddot{F}e)$	2	2, 8		6	4.75		I.
189	Chromite	153	$Fe\,O\,Cr_2\,O_3$	13–2	8	H	5.5	4.3		I.
190	Uraninite	154	$U\,O\,U\,O_3$	8–2	8, 2	Z. H	5.5	6.4–7		I.
191	Chrysoberyl	155	$Be^3\,O\,Al_2\,O_3$	65 to 67, 4	72		8 5	3.7		III.
192	Cassiterite	157	$Sn\,O$	8–2	71 and 66		6–7	6.4–7.1		II.
193	Rutile	159	$Ti\,O_2$	3, 8, 5, 2	71	E	6.5	4.2		II.
194	Octahedrite	161	$Ti\,O_2$	6, 8, 3, 2	71	B	5.5	3.8–3 9		II.
195	Hausmannite	162	$Mn^2\,O\,Mn\,O_2$	8–2	3	D	5–5.5	4.7		II.
196	Braunite	163	$2\,Mn^2O\,Mn\,O_2+MnO_2\,Si\,O_2$	8–2	2		6–6.5	4.7		II.
197	Minium	163	$Pb^3\,O^4$	3	66		2–3		1	
198	Brookite	164	$Ti\,O_2$	5, 3, 8, 2	71		5.5–6	4.2		III.

Species No.	SPECIES.	Page in Dana.	COMPOSITION.	Color.	Streak or Lustre.	Cleavage or Fracture.	Hardness.	Specific Gravity.	Fusibility.	Crystalization.
198	A. Eumanite	165								
199	Pyrolusite	165	$Mn\ O_2$	13–2	2		2–5	4.82		III.
200	Crednerite	166	$Cu^3\ O\ Mn^2\ O_3$	2	2	D	4.5	5	6	IV.
201	Plattnerite	167	$Pb\ O_2$	13–2	8			9.3		
201	A. Vanadic ochre	167		5						M.
202	Turgite	167	$Fe^2\ O_3\ H$	3–2	3	U. S	5–6	4.14		C.
203	Diaspore	168	$Al\ O_3\ H$	1, 7, 8, 6, 4	72, 31		6.5–7	3.4		III.
204	Göthite	169	$Fe\ O_3\ H$	21–3, 8, 2	sub. 73	E	5–5.5	4.3		III.
205	Manganite	170	$Mn\ O_3\ H$	12–7	3, 8	E	4	4.3		III.
206	Limonite	172	$Fe^2\ O_3\ H^3$	8	5	U. S. G	5–5.5	3.6–4		S.
207	Xanthosiderite	174	$Fe\ O_3\ H^2$	8, 3	78 or 79		2.5			
208	Beauxite	174	$(Al\ O_3, Fe\ O_3)\ H^2$	1, 8, 3	66			2.55		
209	Eliasite	175	$R\ O_3\ H^2$	3, 8	78, 70, 66	78, 73	3.5–4.5	4–5		A M
210	Brucite	175	$Mg\ O\ H$	1, 7, 4	31	D	2.5	2.35		VI.
211	Pyrochroite	177	$(Mn\ O\ Mg\ O)\ H$	1 to 15	31	D	2.5			
212	Gibbsite	177	$Al\ O_3\ H^3\ O_3$	1–5–3	66		2.5–3	2.3		VI.
213	Limnite	178	$Fe\ O_3\ H^3$	8	5	U. S. G	5–5.5	3 6–4		M.
214	Hydrotalcite	178	$Al\ O_3,\ Mg\ O,\ H$	1	31	D	2	2.04		VI.
214	A. Namaqualite	Ap 1–11		19, 6	79		2.5	2.49		
215	Pyroaurite	179	$Fe\ O\ H^3 + 6\ Mg\ O\ H + 6\ H$	5						VI.
216	Gummite	179	$(U\ O_3, Fe\ O_3)\ H^3$	5 to 3	78, 5		2.5–3	3.9–4.20		A.
217	Psilomelane	180	$Mn\ O_2,\ Ba\ O_2,\ H$	2	2, 8		5–6	3.7–4.7		M.
218	Wad	180	$Mn\ O_3\ H$	7, 66, 2	66					
218	A Heterogenite	Ap. 2–27	O, Co, Cu, Fe, Bi, Al, Ca	2, 3, 8			3	D		A.
218	B Wad (Asbolite)	181	$Mn\ O_3$, Co O, H	2	66		2–2.5	3.1–3 3		
218	D. Lithiophorite	Ap 1–9	$\{Mn\ O_3\ Al\ O_3\ Fe\ O\ Co\ O\}$ $\{Cu\ O\ Ba\ O\ Li\ O\ H\}$	6, 2	66		3	3.2–3.6		
218	E. Rabdionite	Ap. 1–13	Mn, Co, Fe, Cu, O	2	73, 78		1	2.8	3	S.
219	Arsenolite	183	$As\ O_3$	1	79		1.5	3.69	V, S.	I.
220	Senarmontite	184	$Sb\ O_3$	1	71	B	2–2 5	5.22	V, S.	I.
221	Valentinite	184	$Sb\ O_3$	1	71	E	2.5–3	5.56	V, S.	III.
221	A Claudetite	796	$As\ O_3$	1	31	E	2 5	3.8		III.
222	Bismite	185	$Bi\ O_3$	4, 5, 7, 1	71, 77, 66			4 3611	1	M.
223	Karelinite	185	$Bi\ O_3$ with Bi S	11, 7	73	ct	2	6.60	1	M.
224	Molybdite	185	$Mo\ O_3$	24, 56, 5	79, 77		1–2	4.5	1	III.
224	A Ilsemannite	Ap. 1–7	$Mo\ O_2 + 4\ Mo\ O_3$	6, 2						
225	Tungstite	186	$W,\ O_3$	5	66					
225	A. Meymacite	Ap 2–38	$W,\ O_3\ 2\ H$	5, 4, 5	24, 5			3.80		
226	Kermesite	186	$Sb\ O_3 + 2\ Sb\ S_3$	27–3	71	D	1, 5	4.5	1	S. IV.
227	Cervantite	187	$Sb\ O^4,\ Sb\ O^5$	5	66–		3	3.2–3.6		III.
228	Stibiconite	188	$Sb\ O^4 + H$	5–3 to 1	31		4.–5. 5	5.28		M.
229	Volgerite	188	$Sb\ O^5 + 5\ H$	1	66	Q		6.6		M.
230	Tellurite	188	$Te\ O_2$	1–5						
230	A. Tantalic Ochre	188	Ta	8	72					
231	— Quartz	189	$Si\ O_2$	$\{23, 1, 66\}$ $\{5, 3, —\}$	72	Z	7	2.6		VI.
231	A. Tridymite	805	$Si\ O_2$					2.2–2.3		VI.
231	B. Asmanite	Ap 2–5	$Si\ O_2$			F	5.5	2.245		III.
232	Opal	198	$Si\ O\ H$	$\{23, 64, 1\}$ $\{5, 8, 3.\}$	72		6.–6.5	2–2 3		M A
233	Jenzchite	201	$Si\ O_2$	1				2.6		
234	Enstatite	208	$MgO\ SiO$ or $(MgO\ FeO)SiO_2$	7, 1, 5, 4, 8	31 to 72		5.5	3.1–3.3	6	III.
234	A, Victorite	Ap 2–18		23		Z				
235	Hypersthene	209	$(Mg\ O_2\ Fe\ O)\ Si\ O_2$	8, 4–2	80	93.0	5–6	3.39	5	III.
236	Diaclasite	210	$(Mg\ O, Fe\ O, Ca\ O)\ Si\ O_2$	3, 4 to 7	31	F			5	III.
237	Wollastonite	210	$Ca\ O\ Si\ O_2$	1–7	72	D	4.5–5	9	4.5	IV.
237	A. Edelforsite	212	$2\ Ca\ O\ 3\ Si\ O_2$	1, 71, 5			6–7	2.584		
238	A. Omphacite	223	$R\ O\ R\ O_3,\ Si\ O_2$				5–6	3.2–3.3		IV.
238	B Violan	223	$Si\ Al\ Fe\ Mn\ Mg\ Ca\ Na$	21, 58, 6	59		6	3.233		M.
239	Aegirite	223	$R^3\ O\ Si^3\ O_2 + Fe\ O_3\ Si^3\ O_2$	4, 2	72, 21, 4	W	5.5–6	3.45–3.58	R	IV.
238	Pyroxene	212	$(\dot{R}\ \ddot{S}i$ or $(\dot{R}_3\ \ddot{R})\ (\ddot{S}i\ \dot{A}l\frac{2}{3})^3$	$\{23, 1, 7\}$ $\{8, 4, 2\}$	72	87^0 & 93^0	5.5–6	3.2–3.3	2.5–5	IV.
240	Acmite	224	$(Fe, Na)^3\ Si^3 + 2\ Fe\ Si^3$	3–8 to 2–4	72	93^0	6	3.4	2	IV.
241	Rhodonite	225	$Mn\ O\ SiO_2$	53–3 8–3	72	W	5.5–6.5	3.61	2.5	V.
242	Babingtonite	227	$3\ R^3\ O\ Si^3\ O_2 \cdot Fe\ O_3\ Si^3\ O_2$	21, 4, 2					2.7	V.
243	Spodumene	228	$(\frac{1}{3}(\dot{L}i, \dot{N}a)^3 + \frac{4}{3}\ \dot{A}l)\ \ddot{S}i^3$	1–7, 4–9	31	E	6.5	3.18	3.5	IV.
244	Petalite	229	$^1Al\ O_3, Li\ O, Na\ O, Si\ O_2$	1–7–9	78	D	6.5	2.45	3.5	IV.
245	Kupfferite	230	$Mg\ O\ Si\ O_2$	37, 4	72	W	5.5	3.08		IV.
246	Anthophyllite	231	$Fe\ O\ Si\ O_2 + 3\ Mg\ O\ Si\ O_2$	8, 7, 4	79	E	5.5	3.2	6	III.
246	A. Piddingtonite	232	$R\ O\ R\ O_3 + Si\ O_2$	87, 71	Res	W	6.5	3.421		
247	Amphibole	232	$\dot{R}\ \ddot{S}i$ & $(\dot{R}^3\ \ddot{R})\ (\ddot{S}i\ Al\frac{2}{3})$	$\{2, 3, 1, 7,\}$ $\{8, 4, 23\}$	72	$87^0, 93^0$	5–5.6	3.2–3.5	2 5–5	IV.
247	A. Waldheimite	242	$R\ O\ Si\ O_2$	35, 4			5	2.957		
247	B. Kokscharoffite	242	$R\ O\ Si\ O_2 + R\ O_3\ Si\ O_2$	23, 22, 1, 8			5–5.5	2.97		
247	C. Schefferite	242	$R\ O + Si\ O_2$ — $R\ O\ Si\ O_2$	8, 63, 3	72	A	5–5.5	3.433		IV.
247	D. Nigrescite	Ap. 1–12	$R + R\ O\ R\ O_3\ Si\ O_2$	43, 4		H	2	2.845	M	A.
248	Arfvedsonite	243	$Fe\ O_3\ Fe\ O\ Mn\ O\ Na\ O\ Si\ O_2$	2	72	W, at 123^0	6	3.4	2	IV.
249	Crocidolite	243	$Fe\ O\ Mg\ O, Na, O\ Si\ O_2, H$	4 to 49, 6	79	U	4	3.2	E	F.
250	Wichtisite	244	$(\frac{1}{3}\ R^3\ O + \frac{1}{3}\ R\ O_3)\ Si^3\ O_2$	2	66	Z		3.03	E	M.
251	Glaucophane	244	$(\frac{2}{3}\ R^3\ O + \frac{2}{3}\ R\ O_3)\ Si^3\ O_2$	6, 7	72, 31	F	5.5	3.103–3.113	E	III.
252	Sordavalite	244	$Al\ O_3, Fe\ O, Mg\ O, Si\ O_2, H$	7, 2	70		2.5	2.58	2.5	M.

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253	Tachylyte	245	Fe, Mg, Ca, Na, Al, Si, H	7, 51, 2	72		6.5	2.6	2.5	
253	A. Hyalomelan	245	3 R O, Al$_2$O$_3$ 4½ Si O$_2$?	7, 51, 2	72		6.5	2.71	E	
254	Beryl	245	(⅓ Be^3 O + ½ Al$_2$O$_3$)3 Si O$_2$	23, 9, 6, 5, 4	72		7.5–8	2.6–2.7	5.5	VI
255	Eudialyte	248	(⅔ (Ca, Na, Fe)^2+½ Zr)^2 Si	53 to 8. 3	72	D	5.5	2.9	2.5	VI
256	Pollucite	249	(R$_2^3$ O Al$_2$O$_3$)3 Si O$_2$+⅛ H	23	72, 75	A	6.5	2.901	6	I
257	Forsterite	255	2 Mg O Si O$_2$	1. 7	72	E	6.–7	3.2–3.3		III
258	Monticellite	255	(½ Ca O+½ Mg O)^2 Si O$_2$	1–7	72	E	5.–5 5	3.–3.2	6	III
259	Chrysolite	256	(Mg O, Fe O)^2 Si O$_2$	34, 4	72	E	7	3.3–3.5		III
259	A. Hortonolite	Ap. 1–7	(Fe O, Mg O Mn O)^2 Si O$_2$	5, 2	22, 1	E	6.5	3.9	4	III
260	Fayalite	258	2 Fe O Si O$_2$	2	8	E	6.5	4.1	3	M
261	Iron Manganese Chrysolite	259	R O R O$_3$ Si^2 O$_2$	2	8	E	6.5	4.1	3	
261	A. Roepperite	Ap 1–13	(Fe, Mn, Zn, Mg)^2 Si	21, 4 to 2	72	V	6	4	Dif	III
262	Tephroite	259	Mn^2 O, Si O$_2$	3, 8, 47, 7	72		6	4	3 5	III
262	A. Hydrotephroite	260	(Mn O, Mg O)^2 Si$_2$ O+⅛ H	19, 3	23		4			
263	Knebelite	260	(Fe O Mn O)^2 Si O$_2$	7, 3, 8, 2			6.5	4.12	E	Cry
264	Leucophanite	260	Ca O, Na O, Be O Si O$_2$, Fl.	4–1	72	D	3.5–4	2.97	3	III
265	Wöhlerite	261	Ca O Na O ZrO$_2$ Cb$_2$O$_5$ SiO$_2$	5, 8	72	E	5.5	3.41	3	III
266	Willemite	262	Zn^2 O Si O$_2$	23, 8, 5, 3, 4	72, 70		5.5	3.9–4.2	3.5–5	VI
267	Phenacite	263	Be^2 O Si O$_2$	23, 5, 8	72	Z	7.5–8	3		VI
268	Meliphanite	263	R O R O$_3$ Si O$_2$	5	72	F	5	3.0	E	VI
269	Garnet	265	(⅓ 3 Fe O$_3$+½ Al$_2$O$_3$)^2 Si^2 O$_2$	3 or 8, 3	72		7.–7.5	4	3	I
270	Danalite	265	{(⅓ (Zn Fe, Mn)+⅛ Be)^3 Si O$_2$+⅓ Zn S}	48, 3, 7	72		5.5–6	3.43	E	I
271	Helvite	264	{⅓ (Mn, Fe)+½ Be^2 Si+⅓ Mn S}	59 or 45, 5	70		6.–6.5	3.2	3	I
272	Zircon	272	Zr O$_2$ Si O$_2$	23, 3, 7, 8	71		7.5	4.4–4.6		II
272	A. Malacon	275		8, 3, 8	72 sub 72		6.5	3.9–4.074		
272	B. Cyrtolite	275		8, 3	71		5–5.5	3.98–4.04		
272	C. Tachyaphaltite	275		8, 3	sb 73 to 72					II
272	D. Œrstedite	275		8, 3	71, 81		5.5	3.629		
272	E. Auerbachite	276		8, 7	78 72		6.5	4.06		
272	F. Bragite	276, 525	R O, R O$_3$, +Cb O$_5$, Y O	8	5, 8		6–6.5	5.13–5.35		II
273	Vesuvianite	276	(⅗ Ca^3+⅔ (Al, Fe))^2 Si^3	8, 4, 5, 6	72		6.5	3.3–3.4	3	II
274	Melilite	280	Ca Mg Na Al Fe Si O	1, 5, 8	72	D	5	2.95	3	II
275	Sphenoclase	280	Si$_2$O Al O$_3$ Fe O Mn O Mg O Ca O	19. 7, 5			5–5.6	3.2	3	M
276	Epidote	281	(⅓ Ca^3+⅔ (Al, Fe))^2 Si^3	7, 39, 4, 8, 5	72	2 cleav.	6.7	3.2–3 5	3.–3.5	IV
276	A. Koelbingite	284	R O Si O$_2$	4 to 2	72, 39, 4		5.5–6	3.599		IV
277	Piedmontite	285	Ca Fe Al Si O	27, 3, 3–8	E	72	6.5	3.4	3	IV
278	Allanite	285	Al, Ce, La, Di, Fe, Ca, Si	8, 2	7		5.5–6	3.42	2.5	IV
279	Muromontite	289	R O$_3$, Si O$_2$, Y O	2 or 4, 2	72		7	4.26		A
279	A. Bodenite	289	R O R O$_3$ Ce O							
279	B. Michaelsonite	289	R O, R O$_3$, Si O$_2$ La O	72			4–5	3.44		M
280	Zoisite	290	{(⅓ Ca^3+⅔ (Al, Fe))^2 Si^3 O$_2$}	1, 47, 7	72	E	6.–6.5	3.–3.3	3.–3.5	III
280	A. Jadeite	292	R O, R O$_3$, Si O$_2$	43, 4, 1	31		6.5–7	3.33–3.35	E	M
281	Partschinite	293	R O, R O$_3$, Si O$_2$	5, 3	78	sub. Z	6.5–7	4.006		IV
282	Gadolinite	293	Y O, Ce O, Fe O, Be O, Si O$_2$	2, 4 to 2	72		6.5–7	4.–4.5		III
283	Mosandrite	295	ce O$_3$ Ca O Na O Ti O$_2$ Si O$_2$ H	3, 8	70	E	4	2.95	3	III
284	Ilvaite	296	Fe O Fe O$_3$ Ca O Mn O Si O$_2$	2	2		5.5–6	3.8–4	2.5	III
284	A. Ardennite	Ap 2–4	R O$_3$, R O, Si O$_2$, V O$_5$							
285	Axinite	297	Al, Mn, Fe, Ca, Si, B	63, 8 to 31, 7	72		6.5–7.5	3.27	2	V
286	Danburite	299	Ca^2 O Si O$_2$+B^2 O$_3$ Si$_3$ O$_2$	19.5	72		7	2.9	3	V
287	Iolite	299	2 (Mg Fe) Si+Al^2 Si^3	6	72		7	2.6	5–5.5	III
288	Phlogopite	302	⅔ (Mg R)^3+⅓ Al)^2 Si^3	5, 3, 1	31	L	2.5	2 8	5	III
288	A. Aspidolite	Ap. 1–2	R O R O$_3$ Si O$_2$	34, 4	21	L	1–2	2.72	6	III
289	Biotite	304	{(½ Mg O, K O)^3+½ (Al O$_3$, Fe O$_3$))^2 3 Si O$_2$}	4, 2	81	L	2.5	3	6	VI
290	Lepidomelane	307	K Mg Al Fe Si O	21, 4 to 2	72	Mi	3	3	E	VI?
290	A, Mauganophyllite	Ap 2–36	R O R O$_3$+Si O$_2$	15 to 10.3	19, 3					VI
291	Annite	308	R O R O$_2$ Si O$_2$	2	21, 4		3	3.169		
292	Astrophyllite	308	{Al O$_3$, Fe O$_3$, Mn O, Mg O, Fe O, Na O, K O, Ti O$_2$ Si O$_2$}	15, 5	31	Mi	3	3 32	E	III
293	Muscovite	309	Al O^3 Fe O^3 K O Na O Si O$_2$ H	7, 1, 8, 4	31	Mi	2.5	2.8–3	5.1	III
294	Lepidolite	314	Al O$_3$ Fe O K O Li O Si O$_2$ Fl	53, 3 and 7, 1	72	Mi	2.5–3	2.8–3	2–2.5	III
295	Cryophyllite	316	Al O$_3$ Fe O K O Li O Si O$_2$ H	2, 4 to 8, 3	31	Mi	2.5	2.91	1.5–2	III
295	A. Snarumite	316	Si O$_2$ Al O$_3$ Si O Na O K O	3, 1, 23, 7			4–5.5	2.826		M
296	Sarcolite	317	R O R O$_3$ Li O$_2$	3, 53	72	F	6	2 545	E	II
297	Meionite	318	(⅓ (Ca, Na)^3+⅔ Al)^2 Si^3	23 to 1	72		5.5	2.7	3	II

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298	Paranthite	318	$(\frac{1}{4}\,Ca\,O^3+\frac{3}{4}\,Al_2O_3)^2Si^3O_2$	1, 7, 19, 4	31, 72	Mass	5.5	2.736	E	II.
299	Wernerite	319	$Al_2O_3FeO_3CaONaOKOSiO_2$	1, 7, 6, 4, 2	72 to 78	E	5–6	2.6–2.8	2.5	II.
300	Ekebergite	324	$\{(\frac{1}{3}\,(Ca\,O\,Na\,O)+\frac{2}{3}\,Al_2O_3)^2Si^3O_2+3\,Si\,O_2\}$	1, 7, 4, 6, 3	1 72	E	5.5–6	2.74	E	II.
301	Mizzonite	325	$Ca\ Na\ Al\ Si\ O$	23 to 1	72	E	5.5–6	2.623	E	II.
302	Dipyre	326	$Ca\ Na\ Al\ Si\ O$	23, 1, 4, 3	72, 31		5–5.5	2.646	B	II.
303	Marialite	326	$Ca\ Na\ Al\ Si\ O$	23 or 1	72	E	5.5–6	5.626	E	II.
304	Nephelite	327	$Na\,O, K\,O, Al_2O_3\,Fe\,O_3, Si\,O_2$	23 and 4, 3	72 to 78	Y	5.5–6	2.6	3.5	VI.
304	A. Cancrinite	329	$Al_2O_3, Ca\,O, Na_2O, C\,O_2, Si\,O_2$	1, 9, 7, 5	72	Y	5–6	2.5	2.5	VI.
305	Sodalite	330	$\{\frac{1}{2}\,Na^3\,O+\frac{3}{4}\,Al_2O_3)^2Si^3O_2+\frac{1}{2}\,Na\,Cl\}$	7, 4, 6, 5, 1	72		5.5–6	2.3	3.5–4	I.
305	A. Microsommite	Ap 2–39	$R\,O\,R\,O_3\,Si\,O_2$		23		6	2.60		
306	Lapis-Lazuli	331	$CaO\,Na_2O\,Al_2O_3\,Fe_2O^3\,SO\,SiO_2$	33, 6	72		5–5.5	2.4	3	I.
307	Haüynite	332	$\{(\frac{1}{4}\,Na^3\,O+\frac{3}{4}\,Al_2O_3)^3Si^3O_2+Ca\,O\,S\,O_3\}$	4 to 6	72	N	5.5–6	2.5	4.5	I.
308	Nosite	333	$\{(\frac{1}{4}\,Na^3\,O+\frac{3}{4}\,Al_2O_3)^2Si^3O+\frac{1}{2}\,Na_2O\,S\,O_3\}$	7 to 2	72		5.5	2.3	4.5	I.
309	Leucite	334	$K\,O\,Si\,O_2+Al_2O_3\,Si^3\,O^2$	1, 7	72		5.5	2.4		I.
309	A Maskelynite	Ap 2–37	$Si\,O_2, Al_2O_3, Ca\,O, Na_2O, K$				6.5			I.
310	Anorthite	337	$Ca\,O\,Si\,O_2+Al_2O_3\,Si\,O_2$	23, 1, 7	72	2=Clvs	6–7	2.7	4.5	V.
310	A Cyclopite	340	$R\,O\,R\,O_3\,Si\,O_2$	1			6			V.
310	B. Barsowite	340	$Ca, Mg, Al_2O_3, Fe\,O_3, Si\,O_2$	1	72	C	5.5–6	2.75	4	M.
310	C. Bytownite	340	$Si\,O_2, Al_2O_3, Mg\,O, Ca\,O$	60, 1	31		5.5–6	2.74	5	M.
311	Labradorite	341	$(CaO\,NaO)SiO_2+Al_2O_3Si^2O_2$	1, 7. 8, 4	72	Angle 94°	6	2.7	3.5	V.
312	Andesite	344	$\{(\frac{1}{4}\,(Ca\,O, Na_2O)^3+\frac{3}{4}\,Al_2O_3)^2Si^3O_2+3\,Si\,O_2\}$	1, 7, 4, 5, 3	sub 72, 31	H	5–6	2.61–2.74	5	V.
313	Hyalophane	346	$K\,O, Ba\,O\,Al_2O_3, Si\,O_2$	1, 48, 3	72	2 Clvs	6	2.9	5	IV.
314	Oligoclase	346	$Na_2O, Ca\,O, Al_2O_3, Si\,O_2$	1, 48, 3	72	93°	6	2.6–2.7	3.5	V.
314	A. Tschermakite	Ap 2–57	$3\,R\,O\,Si\,O_2+Al\,O_2\,Si_2\,O_2$	7 to 1	72		6	2.64		M.
315	Albite	348	$Na\,O, Al_2O_3, Si^6\,O_2$	23 to 1, 7, 66, 4	72	93° 30′	6	2.6	4	V.
316	Orthoclase	352	$K\,O, Al_2O_3, Si^6\,O_2$	23 to 1, 48, 3, 7, 4	72	Right Angle	6	2.5–2.6	5	IV.
317										
318										
319	Chondrodite	363	$8\,Mg\,O, Si^3\,O_2, Fl$	1, 3, 5, 8, 4	72, 70,		6.5	3.2		III.
320	Tourmaline	365	$Al, Fe, Mn, Mg, Si, B, Fl$	2, 8, 4, 6, 9, 1	72		6.5–7.5	2.9–3.3	3–5	VI.
321	Gehlenite	370	$\{(\frac{1}{2}\,(Ca\,O, Mg\,O)^3+\frac{1}{2}\,(Al_2O_3\,Fe\,O_3))\,Si\,O_2\}$	7, 1	70		5.5–6	3	5.7	II.
322	Andalusite	371	$Al_2O_3\,Si\,O_2$	1, 7, 5, 3	72	E	7.5	3.2		III.
322	A Myelin	373	$Al_2O_3, Si\,O_2$	5, 3, 1	66		2	2.5		
323	Fibrolite	373	$Al_2O_3, Si\,O_2$	1, 8, 4, 3	72	E	6–7	3 2		IV.
323	A. Westanite	Ap 1–16	$Si\,O_2, Al_2O_3\,P_2O_5, Fe\,O_3, H$	57, 3			2.5			M.
24	Cyanite	375	$Al_2O_3, Si\,O_2$	6, 1, 7, 4, 2	72, 31	E	5.7	3.6		V.
325	Topaz	376	$Al_2O_3, Si\,O_2, Fl$	23, 1, 6, 4, 5	72	D	8	3.5		III.
326	Euclase	379	$(\frac{1}{6}\,H^3+\frac{2}{5}Be^3+\frac{3}{5}\,Al)\,Si$	38, 4, 6, 1	72	E	7.5	3.1	5.5	IV.
327	Datolite	380	$(Ca^3\,O, H^3, B\,O_3)\,Si\,O_2$	23, 1, 4, 5, 3	72		5.5	3	2	IV.
328	Guarinite	383	$(Ca\,O+Ti\,O_2)\,Si\,O_2$	45, 5	72	E	6	3.48	3	II.
330	Grothite	386	$R\,O.\,R\,O_3, Ti\,O_2, Si\,O_2$	63 to 2, 8	72 to 78	ct	6.5	3.52–3.60		IV.
331	Keilhauite	387	$CaO\,YO\,Fe_2O_3\,Al_2O_3\,Ti_2O_2\,SiO_2$	8, 2	70		6.5	3.7	3	IV.
332	Tscheffkinite	387	$Ce\,O, Fe\,O, Ti\,O_2, Si\,O_2$	2	72		5–5.5	4.5	E	M.
333	Staurolite	388	$Al_2O_3\,Fe\,O_3\,Fe\,O\,Mg\,O\,Si\,O_2$	8, 3, 2	72		7	3.6	— E?	III.
334	Schorlomite	390	$Fe\,O_3, Ca\,O, Ti\,O_2, Si\,O_2$	2			7–7.5	3.8	3	M.
335	Sapphirine	391	$3\,Mg\,O+4\,Al_2O_3+1\frac{1}{4}\,Si\,O_2$	19, 6, 4	72		7–8	3.42–3.48		III?
335	A. Trautwinite	Ap. 2–56	$R\,O.\,R\,O_3, Si\,O_3$	4	66–7		1–2		E	
336	Eulytite	391	$Bi^2\,O_3\,Si^3\,O_2$	21, 55 to 5	70		4.5	6.1	E	I.
336	A. Agricolite	Ap. 2–1	$Bi^2\,O_3\,Si^3\,O_2$	8, 23, 5		F	soft			IV.
337	Atelestite	392	Bi	24, 5	71, 78		5			IV.
338	Hypochlorite	392	$SiO_2\,Al_2O_3\,Bi_2O_3\,FeO\,P_2O_5\,Mn$	4	72, 4	F, Z	6	2.9–3.04		Cry
338	Isopyre	392	$Si\,O^2, Al_2O^3, Fe\,O^3, Ca\,O, Cu\,O$	7 or 2	72, 4, 7	F	6–6.5	2.9–3	E	M.
339	Pectolite	396	$(\frac{4}{5}\,Ca+\frac{1}{5}\,Na+\frac{1}{5}\,H)\,Si$	1 to 7	70	U	5	2.7	2	IV.
340	Xonaltite	397	$4\,Ca\,O, Si\,O_2+H\,O$	1 to 7				2.71		M.
340	A. Plombierite	802	$Ca\,O, Si\,O_2+2\,H\,O$	1			soft			
341	Okenite	398	$(\frac{1}{2}\,HO+\frac{1}{2}\,CaO)\,SiO_2+\frac{1}{2}\,H$	1	31	U	4.5–5	2.3	E	III?
341	A. Centrallassite	796	$R\,O_2\,R\,O_2\,Si\,O_2$	1 or 5	31		3.5	2 45	E	M.
341	B. Cyanolite	797	" " "	6, 7			4.5	2.495	F	A.
342	Gyrolite	398	$(\frac{2}{3}\,Ca\,O+\frac{1}{3}\,H)\,Si\,O_2+H$	1	72, 31		3–4		E	M.
343	Laumontite	399	$Ca\,O, Al_2O_3, Si^4\,O_2, H^4$	1, 7, 3	31	E	3.5	2.3	E	IV.
343	A. Leonhardite	401	$Si\,O_2, Al_2O_3, Ca\,O, H$	1, 5, 8	31, 72	W	3–3.5	2.25	E	IV.
344	Catapleiite	401	$Zr\,O_2, Na_2O.\,Ca\,O, Si\,O_2, H$	5, 8	72	E	6	2.8	3	VI.
345	Dioptase	401	$Cu\,O\,Si\,O_2+H$	37, 4	72	I	5	3.3		VI.
346	Chrysocolla	402	$Cu\,O, Si\,O_2+2\,H$	6 to 4	72		2–4	2.2		
346	A. Cyanochalcite	Ap. 1–4	$Si\,O_2, P\,O_5\,Cu\,O, H$	33, 6	74 to 66	S	4.5	2.79		M.
346	B. Resanite	Ap. 2–48	$R^2\,O\,Si^3\,O_2+9\,aq$	34, 4			2.06			
347	Alipite	404	$(\frac{1}{3}\,H+\frac{2}{3}(Ni\,O, Mg\,O))\,Si\,O_2$	43, 4			2.5	1.44–1.46		M.
348	Conarite	405	$(\frac{1}{3}\,H+\frac{2}{3}\,Ni\,O)\,Si\,O_2+\frac{2}{3}\,H$	6, 34, 4		W	2.5–3	459-2.619		IV?
349	Picrosmine	405	$Mg\,O\,Si\,O_2+\frac{1}{3}\,H$	9–34–4	4		2.5–3	2.66		III.
349	A. Hydrosilicite	799	$R\,O\,Si\,O_2+H$							A.
350	Spadaite	405	$(\frac{5}{3}\,Mg+\frac{1}{3}\,H)\,Si\,O_2+\frac{1}{3}\,H$	3	31, 78	J. Z	2.5		E	M.
351	Pyrallolite	406	Pyroxene altering into							
352	Pycrophyll	406	Steatite							

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353	Traversellite	406	Pyroxene altering into							
354	Pitkarandite	406	Steatite							
355	Strakonitzite	406								
356	Mouradite	406	MgO, FeO, SiO_2, H	5	72		6	3.7		
357	Neolite	406	MgO, Al_2O_3, SiO_2, H	4	79		1–2	2.77		F
358	Paligorskite	406	RO, R_2O_3, SiO_2, H	1		K		2.217		F
359	Xylotile	406	Fe_2O_3, MgO, H, SiO_2	52, 8	79	U		2.4	E	
360	Anthosiderite	407	$Fe^2O_3, Si^9O_2 + 2H$	44, 5, 5, 8	79	K	6.5	3	5.5	F
361	Calamine	407	$Zn^2O\,SiO_2 + H$	23, 1, 5, 4, 6	72	E	4–4.5	3.5	6	III.
362	Villarsite	409	$(\frac{1}{2}\frac{1}{2}Mg + \frac{1}{12}Fe)^2Si + \frac{1}{6}H$				4–5	2.978		III.
362	A. Moresnetite	409	SiO_2, Al_2O_3, ZnO, NiO	4	1	Z	2.5			D
363	Prehnite	410	$Ca, {}^3(Al, Fe), Si^6, H^5$	43 to 62, 4, 1	72	D	6.–6.5	2.9	2	III.
363	A. Uigite	412	RO, R_2O_3, SiO_2	1, 6	31		5.5	2.284	E	
364	Chlorastrolite	412	RO, R_2O_3, SiO_2	6, 4	31		5.5–6	3.180	E	M
365	Tritomite	412		66, 8	sub 73, 72		5.5	3.9–4.66		I
366	Thorite	413	$ThO_2, SiO_2 + 1\frac{1}{2}H$	56, 8, 2	70		4.5–5	5–5.4		I
367	Cerite	413	$(CeO, LaO, DiO)^2SiO_2 + H$	27, 3, 63, 8	70		5.5	4.9		
368	Erdmannite	414	RO, R_2O_3, SiO_2, La	21, 8	72			3.1	6	
369	Pyrosmalite	414	MnO, FeO, SiO_2, Cl, H	8 to 2, 4	31	D	4.5	3.16	2.5	VI
370	Apophyllite	415	$(\frac{1}{8}(Ca, K) + \frac{1}{8}H)^2Si + H\,Si$	23, 1, 53, 3, 5	72, 31	D	5	2.3	1.5	II
370	A. Chalcomorphite	Ap. 2–11	$SiO_2, Al_2O_3, CaO, H, CO_2$	1	82		5	2.54	6	VI
371	Edingtonite	417	Al_2O_3, BaO, SiO_2, H	1, 9	72	E	4.5	2.7	E	II
372	Gismondite	418	$Al_2O_3, CaO, KO, SiO_2, H$	6, 1 to 1	81		4.5	2.26	E	III.
373	Carpholite	419	$(Al, Fe, Mn)^2Si^3 + 3H$	46, 5	79	U	5–5 5	2.9	3.5	III.
374	Allophane	419	$Al_2O_3, SiO_2 + 6H$	1, 6, 5, 4	70, 72	F	3	1.87		A
375	Collyrite	420	$Al^2O_3, SiO_2 + 9H$	1	74		1–2	2.1		A
375	A. Dillnite	421	$Al^4O_3Si^3O_2 + 9H$				1.8–2	2.574–2.855		
376	Schrötterite	421	$Al^8O_3Si^3O_2 + 30H$	1, 4	70		3.5	2		
376	A. Scarbroite	421	SiO_2, Al_2O_3, H	1			2.0	1.485		
376	B. Uranophane	805	$(\frac{1}{6}R^3 + \frac{5}{6}R)\,Si + 3H$	45–5–35–4.2			2.5–3	2.6–2.8		III.
377	Thomsonite	424	$(Ca, Na), Al, 2\,Si, 2\frac{1}{2}H$	1	72	E	5	2.35	2	III.
377	A. Rauite	Ap. 2–47	RO, R_2O_3, SiO_2, H	7, 2			5	2.48	6	M
378	Natrolite	426	$NaO, Al_2O_3, Si^3O_2, H^2$	1 to 3	72		5.5	2.25	2	III.
379	Scolecite	428	$CaO, Al_2O_3, Si^3O_2, H^3$	1	72	E	5.5	2.2	2.2	IV
380	Ellagite	430	RO, R_2O_3, SiO_2, H	8, 5		W			E	M
381	Mesolite	430	$(CaO\,NaO)Al^3O_3, SiO_2, 3H$	1	79	U	5	2.3	E	V?
382	Levynite	431	$3\,Si, Al, (Ca, Na, K), 4H$	23, 1, 7, 4, 3	72		4–4.5	2 09–2.16		VI
383	Analcite	432	$Al_2O_3, NaO, Si^4O_2, H^2$	23to1,7,4,5,3	72	not Clev.	5–5.5	2.28	2.5	I
384	Eudnophite	433	SiO_2, Al_2O_3, NaO, H	1, 7, 8	1		5.5	2.27	E	III.
385	Faujasite	433	$4\frac{1}{2}Si, Al\,(\frac{1}{3}Ca + \frac{1}{4}Na), 9H$	23, 1, 8	72	H	5	1.923	E	I
386	Chabazite	434	$4\,Si\,Al, (\frac{2}{3}Ca + \frac{1}{5}(Na\,K))\,6$	1, 3	72	F. H	4–5	2.08–2.19	E	VI
387	Gmelinite	436	$4\,Si.Al, \frac{1}{2}Ca + \frac{1}{3}(Na.K)6\,H$	23, 5, 1, 4, 1, 3, 1, 48, 3	72	F	4.5	2.04–2.17	2.5–3	VI
388	Herschelite	437	$4\,SiO_2, Al\,O_3\,(\frac{3}{4}Na\,O + \frac{1}{4}K\,O), 5H$	23 or 1	72	D	5.5	2.06	E	III.
389	Phillipsite	438	$(Ca, K), Al_2O_3, 4\,SiO_2, 3H$	1, (3)	72		4–4.5	2.2	3	III.
390	Harmotome	439	$BaO, Al_2O_3, Si^5O_2, H^5$	1, 3	72		4.5	2.45	3 5	III.
391	Hypostilbite	441	$(Na, Ca)\,Al, 4\frac{1}{2}\,Si, H^6$	1	72	U	3.5–4	2.2	E	
392	Stilbite	442	$CaO, Al_2O_3, Si^6O_2, H^6$	1, 5, 3	31, 72	E	3.5–4	2.16	2.–2.5	III.
393	Epistilbite	443	$6\,Si, Al, (\frac{4}{5}Ca + \frac{1}{5}Na)\,5H$	1, 6, 5	72	H	4–4.5	2.249	E	III.
393	A. Reissite	Ap 1–14	$RO, R_2O_3, Li_2O\,H$	23 to 1	72				E	III.
394	Heulandite	444	$CaO, Al_2O_3, Si^6O_2, H^5$	1, 3	31, 72	Cld	3.5–4	2.2	2–2.5	IV
395	Brewsterite	445	$Al\,O_3(\frac{2}{3}Sr + \frac{1}{3}Ba)Si^6H^5$	5, 1, to 7	31, 72	E	5	2.45	3	IV
396	Mordenite	446	$(Na, Ca), Al, Si^9, H^6$	1	79	Cry	5	2.08	E	
397	Sloanite	446	RO, R_2O_3, Li_2O_3, H	1	31, 1	ct	4.5	2.441	E	III.
398	Saspachite	447	RO, R_2O_3, Li_2, H				4.5	1.465	E	
	Talc	451	$MgO, Si^5O_2 + 2H$	1, 43 to 21	31	L, S	1	2.7	6	III.
	A. Talcoid	454	LiO_2, MgO, FeO_2, H	60, 1						
401	Pyrophyllite	454	$Al_2O_3, Si^3O_2 + H$	1, 7, 4	31	Mi to T	1.–2	2.9	6	III.
401	? Pihlite	455	$(R^3O, Al_2O_3)\,Si^3O_2$	1, 68, 5			1.5	2.72	6	
402	Sepiolite	456	$Mg^2O\,Si^3O_2 + 2H$	7, 1	66		2–2.5		5	C
403	Aphrodite	457	$MgO\,Si_2O + \frac{3}{4}H$	64, 1				2.21		C
404	Cimolite	457	$Al^2O_3\,Si^9O_2 + 3H$	1, 7, 3	66		Soft	2.2		A
404	A. Sphragidite	458	RO, R_2O_3, Si_2O_2, H	5. 7, 8						
404	B. Ehrenbergit	458	RO, RO_3, SiO_2, H							
404	C. Anauxite	458	Al_2O_3, SiO_2, H	4, 1			2–2.5	2.26		
404	D. Portite	458	$Al_2O_3\,Si^3O_2 + 2H$	1	72	ct	5	2.4	F	III.
404	E. Nefedieffite	Ap 2–41	$H_6\,Mg\,Al_2\,Si_5\,O_{17}$	1, to 53, 3		Z	1.15	2.335		A
405	Smectite	458	$(\frac{1}{2}Al + \frac{1}{2}H^3)\,Si^3 + 4\frac{1}{2}H$	1, 7, 4	23		Soft	1.9–2.1		M

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406	Montmorillonite	459	$(\frac{4}{3}\dot{\dot{\dot{A}}}l+\frac{1}{5}H^3)\ddot{\ddot{S}}i^3+5\ H$	1 to 7, 4.53, 3			Soft		E	M
406	A. Razoumoffskin	460	R O, R O_3, Si O_2, R	4, 1						
407	Sulphomelane	460	Fe, Fe, Al, Mg Li, H O	15, 5, to 4, 7.	3	sub.	S	3	2.76	E
408	Chloropal	461	(Fe, ^{3}Fe O_3) Si^3 O_3+4½ H	3, 4 to 5	7		2.5–4.5	2		M
409	Glauconite	462	Si K Fe Al Mg H O	21, 34 to 54, 4	6		2	2.2–2.4		A
410	Celadonite	463	Si O_2, Fe O_3, Mg O, K O, H	22, 34, 4			Soft			
411	Serpentine	464	{2 Mg O Si O_2+Mg O H, with small amount of Fe}	{1, 7 various shades of 62.4, 5, 3 & 2}	{Sub. 70, 78, 31, 70, 79 and 77}	K	2.5–5.5	2.5–2.65	6	Only found in Pseud.
412	Bastite, or Schiller	Spar 469	R O, R O_2, Si O_2, H				3.4	2.55	6	
412	A. Refdanskite	803	R O, Si O_2, H Ni	22, 7, 4				2.77		M
413	Deweylite	469	Mg O, Si, O_2 H	1, 5, 3	7	8	3	2.2	5	A
414	Cerolite	470	Si O_2, Mg O, H	5, 3, 4			2.–2.5	2.3		M
414	A. Limbachite	Ap 2–34	3 $\dot{\dot{M}}g$ 2 $\ddot{\ddot{S}}i$+$\dot{\dot{\dot{A}}}l$ $\ddot{\ddot{S}}i$+3 H	7 to 4	7	8		2.395		M
415	Hydrophite	470	R O, R O_3, Si O_2 H	4			2.5–3.5	2.65	3	M
415	A. Dermatin	471	(Mg O, Fe)^3 Si^2 O_2+6 H	4	7	2				M
415	B. Aquacreptite	Ap. 1–2	Si O_2, Al O_3 Mg O, Fe O, H	8, 5	6	F	2.5	2.05		M
416	Genthite	471	Ni, Mg O, Si O_2, H	43 to 37, 4	7	0	3.–4	2 4		A
417	Saponite	472	R O, R O_3, Si O_2, H	1, 5, 7 6, 3, 4	7	8	Soft	2.266	6	M
418	Pholerite	472	Al^2 O_3 Si^3 O_2+4 H	1, 7, 3	3	1	1.–2	2.5		III
418	A. Teratolite	473	R O, R O_3, Si O_2, H	49, 6			2–2⅓	2.49		
419	Kaolinite	473	Al O_3 Si^2 O_2+2 H	1, 7, 8	3	1	1.–2	2.5		III
420	Halloysite	475	Al O_3, Si^2 O_2+3 H	1, 7, 4, 5, 3	5	9	1.–2	2		M
420	A. Sinopite	477	R O. R O_3, Si O_2 H	37, 3						
420	B Melinite	477	R O R O_3 Si O_2 H	5				2.24		
420	C. Ochran	477	Si O_2 Al O_3 Fe O_3	5	5 to 23		1–2	2.4–2.5		
420	D. Oravitzite	477	Si O_2, R O, R O_3, H Zn O	4, 1	5	9	2–2½	2.701		M
420	E. Hverlera	478	Si O_2, Al O_3, Fe O_3, Mg O, Ti	1, 3						
420	F. Keffekilite	478	R O, R O_3, Si O_2, H	31, 7				2.40		
420	G. Melopsite	478	R O R O_3, Si O_2 H	1, 5, 7						
420	H. Achtaragdite	478	R O R O_3 Si O_2 H	7, 1						M
421	Samoite	478	Al^2 O_3 Si^3 O_2+10 H	1, 7, 5			4–4.5	1.7–1.9		S
422	Pinite	479	(¼ H+¾ (R^3 R)) $^2Si^3$ O_2	7, 1, 4, 8, 3	5	9	2.5 3.5	2.6–2 85	E	A
422	A. Gümbellite	Ap. 1–6	R O, R O_3, Si O_2 H	4, 1	3	1	Soft		4	
423	Cataspilite	483	(⅗ R^3+⅖ $\dot{\dot{\dot{A}}}l$) $^2Si^3$+¾ H	47, 7	3	1	2 5		E	P
423	A. Neurolite	4 2	Si O_2, Al O_3, H	4, 5			4.25	2.476		
423	B	482	R O, R O_3 Si O_2 H	4	5	9	3	2.66	E	M
424	Biharite	483	R O_3, R O, Si O_2 H	5. 4, 8	7	8	2.5	2.737		M
425	Palagonite	483	Al Fe Mg Ca Na Si O	5, 3, 2	7	2, 7	4–5	1.8–2.7	E	A
426	Fahlunite	484	Al Fe Si O	7, 4	2	3	D	3 5–5	2.6–2.8	E
427	Groppite	486	R O, R O_3, Si O_2, H	53, 3 to 8, 3			2.5	2.73	6	Cry
428	Voigtite	486	Al O_3 Fe O_3 Fe O Mg O SiO_2 H	35, 4, 5	3	Mi	2.5	2.91	C	
429	Margarodite	487	Muscovite +H	1, 7	3	L	2.5	2.8	6	III
429	A. Gilbertite	Ap. 2–24	R O, R O_3, Si O_2, H, Fl	1, 4, 5			1	2.65	6	M
430	Damourite	487	Si O_2, Al O_3, Fe O_3, K O, H	5, 1	3	1	2–3	2.791		
430	A. Sericite	487	R O R O_3 Si O_2 H Ti	4, 5, 1			1	2.897		
431	Paragonite	487	(½ (H^3, Na^3)+⅔ $\dot{\dot{\dot{A}}}l$)^2 $\ddot{\ddot{S}}i^2$		3	1	2.5–3	2.779		M
431	A. Ivigtite	Ap. 1–7	Si O_2, Al O_3, Fe O_3, Na O, H	8, 5			2–2.5	2.05	E	
432	Euphyllite	488	Al O_3, K O, Na O, Si O_2, H	1	3	L	3.5	2.8	4.–4 5	
433	Œllacherite	489	Ba O K O Mg O Al O_3 SiO_2 H	1, 7	3	L		2.9		
434	Cookeite	489	Al O_3, SiO_2, K O, SiO_2, H, Fl	1	3	Mi	2.5	2.7	D	
435	Hisingerite	489	(3R O^3 R O_3)$^2Si^3O_2$+4 aq	2, 8	7	8 to 7 2	Z	3	3.045	A
436	Ekmannite	490	Fe, Mn O, Mg O, SiO_2, H	35, 4 to 2	7	8	2.5		E	
437	Neotocite	491	(R^3 O, R O_2) $^2Si^3$ O_2	2, 21, 8	6	6	3–4	2.64	6	A
438	Stübelite	492	R O. R O_3, Si O_2, H, Cu O	51, 2	7	2	4–5	2.223		
439	Gillingite	492	(R^3 O, R O_3) $^2Si^3O_2$+6 aq	2	7	4 to 6	6	3.045	E	A
440	Jollyte	492	($\frac{1}{3}$(Fe Mg)^3+$\frac{1}{3}$ A Hl) Si^3+4	8			3	2 61	D	A
441	Epichlorite	493	R O, R O_3, Si O_2, H	66, 35, 4	7	8	2–2.5	2 76	6	F
442	Polyhydrite	493	Si Fe, Fe Al, Mn O	61, 8	6	6	2–3	2 695		A
442	B. Hygrophilite	Ap. 2–29	R O, R O_3, Si O_2, H	4, 7, 5	7	8	2–2.5	2.67	E	
443	Lillite	493	R O, R O_3, Si O_2, H	4			2	3.043		M
444	Chlorite-like Mineral	493	Si O_2, Al O_3, Fe O_3, Fe O, H	21, 35, 4						
445	Pyrosclerite	493	{⅔ Mg O, Fe O)^3+⅓ (Al O_3, Cr O_3)} $^2Si^3O_2$+3H	43 to 37, 4	3	Mi	3	2.74	4	III
445	A. Vermiculite	498	Mg O, Fe O, Al O_3, Si O_2, H	8, 5	3	Mi	1.5	2.75	3.5	VI
445	D. Vaalite	Ap. 2–58	R Si+2 (3 Mg, 2 Si, 2 H)							IV
445	C. Hallite	Ap. 2–26	R O, R O_3, H	4, 5						VI?
446	Chonicrite	494	Al O_3, Mg O, Ca O, Si O_2, H	1, 5	7	9	2.5–3	2.9	3.54	M
447	Jefferisite	494	Mg O, Fe O_3, Al O_3, Si O_2, H	8, 5	3	Mi	1.5	2 3	E	III?
447	A. Kerrite	Ap. 2–31	Mg O. Fe O_3, Al O_3, Si O_2, H	4, 5	3	Mi	1.5	2.3	E	
447	B. Maconite	Ap. 2–36	K O. Mg O. Fe. Al O_3, SiO_2, H	21, 8	3	Mi	2	2.8	5.5	
448	Penninite	495	8 (Mg^3O, AlO_3) 9 SiO_2. 12 H	4, 7, 3	3	L	2.5	2 7		VI
448	A. Allophite	Ap. 2–2	2 ($\dot{\dot{A}}l$ $\ddot{\ddot{S}}i$)+3 (3 $\dot{M}g$ $\ddot{S}i$	19, 7, 4			2.5	2 64		M

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449	Delessite	497	$MgO, Al_2O_3, Fe_2O_3, SiO_2, H_2O$	21, 34, 4			1–2.5	2.89	6	M.
449	A. Euralite	Ap. 1–6	$Al_2O_3\ FeO_3\ FeOMgO\ SiO_2H$	21, 4 to 2			2.5	2.62	E	
450	Ripidolite	497	$Mg^6O, Al_2O_3, Si^3O_2, H^4$	shades of 4 to 3	81, 31	L	2.5	2.7	6	IV
451	Leuchtenbergite	500	$(\frac{3}{2}\dot{M}g^3+\frac{2}{5}\dot{A}l)\ \ddot{S}i+1\frac{1}{2}\ \ddot{H}$	1	31	D	2.5	2.65	6	VI
452	Prochlorite	501	Al Fe Si H O	4, 2	31	L	1.–2	2.7–2.9	6	VI?
453	Grengesite	502	R O, R_2O_3, Si_2O_3, Cr_2O_3	6, 8, 4		Mi				Cry
454	Aphrosiderite	502	$Fe^3O_3\ SiO_2\ AlO_3SiO_2+2\ H$	21, 34, 4			1	2.8		
454	A. Strigovite	Ap. 2–53	R O, R_2O_3, Si_2O_3, H	21, 4	4		1	3.144	6	
455	Metachlorite	503	R O, R_2O_3, Si_2O_3, H	66, 35, 4	31		2.5			
455	A. Dumasite	503		54			soft			
456	Cronstedtite	503	Mn, Mg, Fe, Si, H O	50, 2	72	D	3.5	3.35	E	VI
456	A. Sideroschisolite	504	$Fe_4O, Si_2O+1\frac{1}{2}\ \ddot{H}$	50, 2	4	D.W	3–3.4	2.5	E	VI
457	Corundophilite	504	$(\frac{1}{3}\dot{R}^3+\frac{1}{2}\dot{A}l)\ 4\ddot{S}i^3+5\ H$	34, 4, 35, 4			2.5	2.90		IV
458	Chloritoid	504	Al Fe Mg Si H O	7, 4, 2	72	D	5.–6	3.5–3.6	6	IV
458	A. Phyllite	506	R O, R_2O_3, Si_2O_3, H, Mn	2, 7, 4	2, 7	T	5–5 5	4.4	6	
458	B. Guadalcazarite	Ap. 2–15	6 Hg S+Zn S	13, 2	2	S	2	7.15	E	M
459	Margarite	509	$Al_2O_3, CaO, Na_2O, Si_2O_3, H_2O$	1, 3, 7	31	Mi	4	2.99	4–4.5	III
459	A. Dudleyite	Ap. 2–17	$NaOMgOFeO_3AlO_3SiO_2H$	15	31	Mi			6	
459	B. Willcoxite	Ap. 2–61	K, Na, Mg, Fe, Al, Si, H	7	31	Mi	1.5		6	
460	Thuringite	407	Al Fe Si H O	34, 4, 39, 4	74 to 66	K	2.5	3.186	3	M
461	Seybertite	508	Al, Fe, Mg, Ca, Si, H	5, 3, 8	31	L	4.5	3.1		III
462	Wolchonskoite	509	Cr, Al, Fe, Mg, Si, H	6, 38, 4	66		2.–2.5	2 3		A
463	Selwynite	509	$SiO_2, AlO_3, CrO_3, Mg, H$	37, 4		H	3.5	2.53	6	M
464	Chrome Ochre	510	$Si_2O_3\ (AlO_3, CrO_3, FeO_3)^2$	4				2.7		
465	Miloschite	510	$(AlO_3, CrO_3)SiO_2+3\ H$	6, 4			1.5	2.13		C
466	Pimelite	510	Si, Al, Fe, Ni, Mg, H	43, 4	78		2.5	2.23–2.3		M
467	Chlorophæite	510	Fe O $Si_2O+6\ H$?	21, 4, 34, 4			1.5–2	2.02	E	G M
468	Klipsteinite	511	Mn_2O_3, Mn O, Si_2O_3, H	21, 61, 8 to 2	66 to sub73				E	A.C
469	Chamoisite	511	Si_2O_3, Al_2O_3, Fe O, H	4, 7 to 2			3	3–3.4	E	
470	Alvite	511	Si, Al, Be, Fe, Zr, Th C	3, 8	78		5.5	3.601		II
470	A. Picrofluite	512	Si_2O_3, Mg O, Ca O, H Fe	1, 5, 6	78 to 66		2.5	2.74	E	A
471	Pyrochlore	512	Ca O, Ce O, Cb_2O_5	8, 3	72		5 5	4.3		I
471	A. Koppite	Ap. 2–32	5 R O, 2 Cb_2O_5	8						
472	Microlite	513	$Cb_2O_5\ CaO\ W_2O_3\ Y_2O\ U_2O_2$	8, 5	72, 70		5.5	4.485–5.562		I
473	Tantalite	514	Fe O, Mn O, Ta_2O_5, Sn_2O_2	2	2, 8	F	6.–6.5	7.–8		III
474	Columbite	515	$FeO\ MnO\ Cb_2O_5\ Ta_2O_5\ SnO_2$	2	3, 2	F	6–	5 4–6.5		III
475	Tapiolite	518	Fe^5O, Ta^4O_5	2	71, 73	not ct., C	6	7.35		II
476	Hielmite	519	Ta, Sn, W, Fe, U, Y	2	73	not ct	5	5.82		M
477	Yttrotantalite	519	Ca, Y, V, Fe, Ta, W	5 to 2	7	Z	5.5	5.7		III
478	Samarskite	520	Cb_2O_5, Fe O, U_2O_3, Y O	20, 2	21, 3		5.5–6	5.6	4.5	III
478	A. Nohlite	Ap. 2–41	$R^3\ Cb_2O_5+1\frac{1}{2}\ H$	2, 8	8	H	4.5–5.0	5.04	E	M
479	Euxenite	521	Y, U, Ce, Ti, Cb, Ta O	8, 2	75, 74		6 5	4.9		III
480	Aeschynite	522	Zr, Fe, Ce, Y, Cb, Ti O	2	70		5–6	5.1		III
481	Polycrase	523	Fe, Ce, Y, Zr, Ti, Cb O	2	sub. 73		5.5–6.5	4.8–5.1		III
482	Polymignite	523	" "							III
483	Fergusonite	524	Y O, Fe O, U O, Cb_2O_5	2	19, 8	Z	5 5–6	5.8		II
484	Adelpholite	525	Cb_2O_5, Fe O, Mn O	8, 5, 8, 2	1		3.5–4.5	3.8		II
485	Mengite	525	Zr_2O_2, Fe O_3, Ti_2O_2	13, 2	81, 8		5–5.5	5.48		III
486	Rutherfordite	526	TiO_2, Ce O	8, 2	5, 8	Z, F	5.5	5.58		IV
490	Xenotime	527	$(Y\ O, Ce\ O)^3\ P_2O_5$	5, 8, 3	70	E	4.–5	4.5		II
490	Osteolite. [Coprolites	533	P_2O_5, Ca O, Si_2O_3, H	1, 7			1–2	2.8–3.1		M
490	B. Phosphate Nodules	534	P_2O_5, Ca O, C O_2, Mg O, Fe_2O_3	8, 2			2.5	2 313		
490	C. Staffelite	534	$CaO, {}^3PO_5, CaO, CO_2$	35, 4 to 4, 5			4	3.13		S
490	D. Guano	535	P_2O_5, Ca O, CO_2	7, 1, 5, 8						
490	E. Epiphosphorite	535	$P_2O_5, CaO, Fe_2O_3, Al_2O_3, SiO_2$	5			4.5–4	3.125		
490	F. Talc-Apatite	535	$3\ CaO\ {}^3PO_5+Mg^3O\ P_2O_5$	64, 1	66, 77		5	2.7–2.75		
490	G. Hydroapatite	535	$3\ Ca^3O\ P_2O_5+Ca\ F+H$	64, 1			5.5	3.10		
491	Cryptolite	529	$Ce^3O\ PO_5$	5–23				4.6		
492	Apatite	530	$Ca^3O\ P_2O_5+\frac{1}{2}Ca\ (Cl\ F)$	54, 4, 6, 5, 3, 1	72		5	2.9–3.2	4.5–5	VI
493	Pyromorphite	535	$3\ Pb^3O+Pb\ Cl$	1, 8, 3	70	F	3.5–4	6 5–7.1	1.5	VI
494	Mimetite	537	$3\ Pb^3O\ As_2O_5+Pb\ Cl$	5, 8	70		3.5	7.1	1	VI
495	Wagnerite	538	$2\ Mg^3O\ P_2O_5+(Mg, Na)\ Fl$	5	72		5.5	3.07	3.5	IV
496	Monazite	539	$Ce_2O, La_2O, Di_2O, Th_2O_2, P_2O_5$	5, 63, 3, 8	70	D	5.–5.5	5.2		IV
497	Turnerite	540	$Ce_2O, La_2O, Di_2O, Th_2O_2, P_2O_5$	5, 8	71, 7		4			IV
498	Triphylite	541	$(Fe\ O, Mn\ O, Li\ O)^3\ P_2O_5$	4 to 7, 6	70	W	5	3.54	1.5	III
499	Sarcopside	Ap. 1–14	Mn O, Fe O, Fe_2O_3, Fl, P_2O_5	48, 3 to 49, 6	79		4	3.7	1.5	IV?
499	Triplite	543	$R^3O_2\ P_2O_5+R\ Fl$	8, 2	70	in 3	5	3.6	1.5	III
500	Hopeite	544	P_2O_5, Zn O, Cd O	7, 1, 3, 8	72, 1	W	2 5–3	2.76–2.85	4.5	III
501	Berzeliite	544	$(CaO, MgO, MnO)^{10}\ As^3O_5$	22, 1 or 45, 5	59	F	5–6	2.52		M
502	Carminite	545	$(\frac{1}{3}\dot{(Li, Na)}^3+\frac{3}{4}\dot{Al})^4\ \ddot{P}$	54, 4, 1, 78, 1	31, 72	W	6	3–3.11	E	III
503	Amblygonite	545	$(Li\ O, Na\ O)^3+\frac{3}{4}Al_2O_3)^4\ P_2O_5$	A little Fl.–(1 7) 4, 7, 1	72	Clev. at 105.9	6	3.11	2	V
503	A. Durangite	Ap. 1–4	Na Al Fe Mn Si Fl As_2O_5	56, 3	72	E	5	4	2	IV
503	B. Hebronite	Ap. 2–27	Na Al Fe Mn Si Fl As_2O_5	7, 1	72	Cl. at 105.0	6	3.04	2	
504	Herderite	546	Na Al Fe Mn Si Fl As_2O_5	5, & 4, 1	72, 1	Z. F	5	2.985	5	III
505	Monimolite	546	$(Pb\ O, Fe\ O, Mn\ O)$ $(Ca\ O, Mg\ O.)^4\ Sb_2O_5$	5	70	C	4.5–5	5.94	E	II
506	Romeite	547	R^3O, Sb_2O^3, Sb_2O_5	45, 5			5.5	4.714	E	II

Species No.	SPECIES.	Page in Dana.	COMPOSITION.	Color.	Streak or Lustre.	Cleavage or Fracture.	Hardness.	Specific Gravity.	Fusibility.	Crystalization.
507	Ammiolite	547	$Hg\ Cu\ Fe\ S\ Sb\ O_5$	21,3					S	
507	A. Rivotite	Ap. 2–48	$Sb_2\ O_5 + 4\ \begin{Bmatrix} Cu\ O \\ Ag\ O \end{Bmatrix} C\ O^2$	5, 4 to 7, 4	7, 4	H	3.5–4	3.55	E	A
508	Arsenate of Nickel	548	$Ni^5\ O\ As\ O_5$	38, 4, 8			4	4.838		M
509	Arsenate of Nickel	548	$Ni^3\ O\ As\ O_5$	24, 5			4	4.982		A
510	Nadorite	Ap. 1–11	Sb, Pb, O, Cl	8, 5	70		3	7.02	S. E.	III.
515	Stercorite	551	$NaO\ N\ H\ ^4O\ P\ O_5 + 9\ H$	1, 8, 5	72			1.6151	E	M
516	Struvite	551	$(N\ H_4O, Mg0)^2\ P\ O_5 + 12H$	5 to 8, 1	72	D	2	1.7	E	III.
517	Haidingerite	552	$(\frac{3}{2}\ CaO + \frac{1}{2}\ H)^3\ As\ O_5 + 3\ H$	1	72, 1		1.5–2.5	2.848	E	III.
518	Brushite	552	$(\frac{3}{2}\ CaO + \frac{1}{2}\ H)^3\ P\ O_5 + 3\ H$	5, 1	31, 72	W	2.–2 5	2.21	E	IV.
518	A. Kollophan	Ap. 1–9	$P\ O_5,\ Ca\ O,\ H,\ C\ O_2$				5	2.70		
519	Metabrushite	553	$(\frac{3}{2}\ Ca\ O + \frac{1}{2}\ H)^3\ P\ O_5 + 3\ H$	19, 5	F		2.5–3	2.288	E	IV.
520	Pharmacolite	554	$Ca^2\ O\ As\ O_5 + 6\ H$	1, 7	72		2,–2.5	2.7	E	IV.
520	A. Picropharmacolite	555	$(CaO, MgO)^5\ As\ O_5 + 12\ H$						E	
520	B. Isoclasite	Ap. 1–7	$Ca^3\ O\ P\ O_5 + Ca\ O\ H + 4\ H$	61, 1	31, 72	W	1.5	2.92	E	IV.
520	C. Wapplerite	Ap. 2–60	$2\ Ca\ O\ As\ O_5 + 8\ H$	1	72		2–2 5	2.48	E	V.
521	Churchite	555	$(\frac{5}{6}\ CeO + \frac{1}{6}\ CaO)^3 PO_5 + 4H$	19, 7	72	Z	3	3.14		VI?.
522	Hoernesite	556	$Mg^3\ O\ As\ O_5 + 8\ H$	60, 1			0.5	2.474	E	IV.
523	Roesslerite	556	$(\frac{3}{2} MgO + \frac{1}{2} H)^3\ As O_5 + 12H$	23, 1	72 to 66		2–3	?	E	
523	A. Bobierrite	795	$Mg^3\ O\ P\ O_5$ with H_2O	Different sh'd'sof6						IV.
524	Vivianite	556	$Fe^3\ O\ P\ O_5 + 8\ H$	31, 72	W		1.5–2	2.6	1.5	IV.
525	Simplesite	558	$Fe\ O,\ As\ O_5$	19, 41, 4	5, 1	W	2.5	2.957		IV.
526	Erythrite	558	$Co^3\ O\ As\ O_5 + 8\ H$	21, 3, 42, 3	31	E	1.5–2.5	2 94	2	IV.
526	A. Roselite	560	$R_3\ O\ As_2\ O_5 + 3\ H$	53, 3	72	ct			E	III.
526	B. Lavendulan	560	$As\ O_5,\ Co\ O,\ Ni\ O,\ Cu\ O$	49, 6			2.5–3	3.014	E	A
526	C. Winklerite	Ap. 2–61	$AsO_5\ Ni\ Cu\ Co\ Ca\ C\ O_2\ H$	6, 2	8	Z	3	3.432		M.
527	Annabergite	560	$Ni^3\ As\ O_5 + 8\ H$	43, 4	77		soft	E	E	IV.
528	Hydrous Bibasic Arsenate of Nickel and Cobalt	560	$(Ni\ O\ Co\ O)^2 As\ O_5 + 8\ H$	7, 1	66 to 79,70		2.5	3.086	D	
529	Cabrerite	561	$R^3\ O\ As\ O_5 + 8\ H$	43, 4	31	W.. C..	2	2.96	I	IV.
530	Köttigite	561	$(ZnOCoO\ NiO)^3 As O_5 + 8\ H$			W	2.5–3		E	IV.
531	Hureaulite	561	$(Mn\ O,\ Fe\ O)^5 P^2\ O_5 + 5\ H$	56 to 3, 5	72		5	3.2	E	IV.
532	Chondrarsenite	562	$Mn^5\ O\ As\ O_5 + 2\frac{1}{2}\ H$	5, 3			3		E	G
533	Trichalcite	562	$Cu^3\ O\ As\ O_5 + 5\ H$	36, 4	79		2.5		F	
534	Thrombolite	562	$Cu\ O,\ H,\ P\ O_5$	37, 35, 4	72	Z	3–4	3.38	E	A
535	Libethenite	563	$Cu^3\ O\ P\ O_5 + Cu\ O\ H$	21, 34, 5	70	Z, H. F.	4	3.7	2	III.
536	Olivenite	564	$Cu^3\ As O_5, P\ O_5) + Cu\ O\ H$	34, 35, 2 to 4			4.5	3.93 (?)	E	III.
537	Adamite	565	$Zn^3\ O\ As\ O_5 + Zn\ O\ H$	58 to 45, 5	72	ct	3.5	4.34	E	III.
538	Conichalcite	565	$Cu\ O\ Ca\ O\ P\ O_5\ As O_5\ Vo^5\ H$	39 to 37, 4			4.5	4.12	E	M.
539	Bayldonite	565	$(Pb\ O,\ Cu\ O)^4\ As\ O_5 + 2\ H$	38 to 2. 4			4.5	5.35	E	M.
540	Euchroite	566	$Cu^3 O\ As\ O_5 + Cu\ O\ H + 6\ H$	35 to 37, 4	72	B	3.5–4	3.39	2	III.
541	Tagilite	566	$Cu_3\ P\ O_5 + Cu\ O\ H + 2\ H$	36 to 37, 4			3	3.5 (?)	F	IV.
541	A Veszelyite	Ap. 2–59	$4\ Cu\ O\ P\ O_5 + 5\ H$				4	3.5		V.
542	Liroconite	567	$Cu\ O,\ Al\ O_3,\ As\ O_5,\ P\ O_5,\ H$	40, 6 to 4	72		2–2.5	2.9	E	IV.
543	Pseudomalachite	568	$Cu^3 O\ P\ O_5 + 2\ Cu\ O\ H + H$	21, 4	72		4.5–5	4.2	2	III.
544	Erinite	569	$Cu^3\ O\ As\ O_5 + 2\ Cu\ O\ H$	38 to 37, 4	66		4.5	4 04	E	
545	Cornwallite	569	$Cu^3 O As O_5 + 2\ Cu O\ H + 3H$	37 to 36, 4		Am	4.5	1.16		A
546	Tyrolite	570	$Cu^3 O As O_5 + 2 Cu O\ H + 7\ H$	43, 35, 4		D	1.–2	3 06	E	III.
547	Clinoclasite	570	$Cu^3\ O\ As\ O_5 + 3\ Cu\ O\ H$	21, 6, 4	31 to 72	D	2.5–3	4.19–4.36	2	IV.
548	Chalcophyllite	571	$Cu^3 As O_5 + 5\ Cu\ O\ H + 7\ H$	37, 38, 4	31	D	2	2.5	E	VI.
549	Berlinite	571	$Al\ O_3\ P\ O_5 + \frac{1}{2}\ H$	1, 7, 3	72		6	2.64		M.
550	Callainite	572	$Al\ O_3$	43, 37, 4			3.5–4	2.50–2.52		M.
550	A. Zepharovichite	Ap. 1–17	$Al\ O_3\ P\ O^5 + 6\ H$	4, 5, 7, 1	72		5	2.87		C
551	Lazulite	572	$AlO_3\ P\ O_5 + (MgO, FeO)\ H$	33, 6	72		5.–6	3.1		IV.
552	Barrandite	574	$(\frac{4}{7}\ Fe + \frac{3}{7}\ Al)\ P + 4\ H$	19, 6, 8, 4	72	Cry	4.5	2.576		
553	Scorodite	574	$Fe\ O_3\ As\ O_5 + 4\ H$	35, 4 to 8			3.5–4	3.2	2	III.
554	Wavellite	575	$Al^3 O_3\ P^2\ O_5 + 12\ H$ with Fl	1, 5, 7, 8, 6, 4	31	rad	3.5–4	2 3		III.
554	A. Kapnicite	576	$Al\ O_3,\ P\ O_5$			U	3.5–4	2.56		
554	B. Planerite	576	$(Al^3 O_3 + 9\ H) + \frac{3}{4}(Cu\ Fe) H$	36, 4	66		5	2.65		M.
554	C. Coeruleolactite	Ap. 1–3	$Al^3\ O_3\ P\ O_5 + 10\ H$	6.41 to 6	72	H	5	2 5		
555	Trolleite	577	$Al\ O_3\ P\ O_5 + \frac{1}{3}\ Al\ O_3\ H^3$	19, 4	72		5.5	3 10		C
556	Plumbogummite	577	$Al\ O_3,\ Pb\ O,\ P\ O_5,\ H$	1, 3 to 5, 7, 4	70		4.–5	4.8	D	
557	Calciofferite	578	$P\ O_5,\ Fe\ O_3,\ Ca\ O,\ H$	24, 5, 4, 5	31	W. F	2.5	2 52–2.529	E	IV?
558	Pharmacosiderite	578	$\begin{Bmatrix} 3\ Fe\ O_3\ As\ O_5 + Fe\ O_3 \\ H^3 + 12\ H \end{Bmatrix}$	4, 3, 8, 5		A	2.5	3	E	I
559	Cirrolite	579	$Al^2 O_3\ P\ O_5 + 2 Ca^3\ P\ O_5 + 3H$	19, 5			5–6	3.08	E	C
560	Childrenite	579	$Al\ O^3\ Fe\ O_3\ Mn\ O\ P\ O_5,\ H$	5, 8 to 8, 2	72		4.5–5	3.18	F	III.
561	Attacolite	580	$P\ O_5\ Al\ O_3\ Fe\ Mn\ Ca\ H$	19, 3			5	3 09	E	M.
562	Augelite	580	$Al^2\ O_3\ P\ O_5 + 3\ H$	23, 19, 3	31	ct		2.77		
563	Turquois	580	$Al\ O_3,\ Cu\ O,\ P\ O_5,\ H$	40, 6 to 4	66		6	2.6–2.8		M.
564	Peganite	582	$Al^2\ O^3\ P\ O_5 + 6\ H$	21, 4, 7, 1	72		3–3.5	2.5		III.
565	Fischerite	582	$Al^2\ O_3\ P\ O_5 + 8\ H$	38 to 34, 4	72		5	2.46		III.
565	A. Variscite	582	$+ 3\ H$	43, 4	1, 74, 78					
566	Tavistockite	582	$(\frac{1}{2} Ca^3\ O + \frac{1}{2}\ Al\ O_3)^2\ P\ O_5$	1	31					
567	Chenevixite	583	$(Fe\ O_3\ Cu^3\ O)^2 As O_5 + 3\ H$	21, 4			4.5	3 93 (?)	E	M.
568	Dufremite	583	$Fe^2\ O_3\ P\ O_5 + 3\ H$	21, 35, 4	79	rad	3.5–4	3.3	E	III.
569	Cacoxenite	584	$Fe^2\ O_3\ P\ O_5 + 12\ H$ (with Fl)	8, 5	79	U, rad	3.–4	3.38	6	
570	Arseniosiderite	584	$Ca\ O,\ Fe\ O_3,\ As\ O_5\ H$	8, 5	79		1.–2	3.8	E	F
571	Evansite	585	$Al^2 O_3\ P\ O_5 + Al\ O_3 H^3 + 15\ H$	1	72		3.5–4	1.94		M.
572	Torbernite	585	$U_2\ O_3\ P\ O_5 + Cu\ O\ H + 7\ H$	38.35 to 37, 4	31	Mi	2.–2.5	3.5	2.5	II.
572	A. Zeunerite	Ap. 2–62	$Cu\ O, 2\ U\ O_3\ As\ O_5 + 8\ H$	5.8, 43, 4	31	D. W	2.5	3.2		II.

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573	Autunite	586	$U^2O_3\,P\,O_5+Ca\,O\,H+7\,H$	26 to 24, 5	31	D	2–2.5	3.1	2.5	III.
573	A. Walpurgite	Ap. 1–16	$B\,O_3,\,U\,O_3,\,As\,O_5,\,H$	59, 5	71	T		5.8		IV.
573	B. Trögerite	Ap. 1–16	$U^5\,O_3\,As^2\,O_5+20\,H$	26. 5	Tr			3 3		IV.
573	C. Uranospinite	Ap 2–58	$Ca\,O,\,U\,O_3,\,As\,O_5+8\,H$	4	W		2.3	3 45		III.
574	Amphithalite	587	$Al\,O_3,\,Ca\,O,\,P\,O_5\,H$	64, 1			6			M.
574	A. Hydrous Phosphate of Alumina and Lime	587	$P\,O_5,\,Al\,O_3,\,Ca\,O,\,H$	21, 57, 3				3.194		C
574	B. Cupreous Phosphate of Alumina	587	$P\,O_5,Si\,O_2\,Al\,O_3Cu\,O\,NaH$	19, 6			Soft			C
575	Sphaerite	587	$Al^5\,O_3\,P^2\,O_5+16\,H$	7, 3	72		4	2.53		
576	Borickite	588	$(Fe\,O_3,\,Ca^3)\,^5P^2\,O_5+15\,H$	3, 8	59		3.5	2.7	E	M
577	Rhagite	Ap. 2–48	$Bi_5\,O_5\,As_2\,O_2\,H_8$ [32 H	3, 4, 59	59	Z	5	6.82	E	
580	Diadochite	588	$Fe^3\,O_3\,P\,2O_5+2\,Fe\,O_3\,S\,O_3+$	3, 5, 8	70	F	3	2.03	E	S
581	Pitticite	589	$Fe\,O_3,\,As\,O_5,\,S\,O_3,\,H$	5 to 3, 8			2–3	2.2–2.5	I	M
582	Beudantite	589	$P.O_5\,H.AsO_5S\,O_3FeO_3.PbO$	21, 34, 4, 2, 8	72	D	3.5–4.5	4–4.3	F	VI
583	Lindackerite	590	$2\,Cu^3AsO_5+NiO^3SO_3+7H$	36 to 43, 4	72, 19, 1		2–2 5		E	III.
584	Svanbergite	590	$AlO_3,CaO,NaO,P\,O_5\,S\,O_3,H$	5 to 5, 8	72		5	3.3	6	VI
585	Ficinite	590	$P\,O_5,\,S\,O_3\,Fe\,O\,Mn\,O,\,H$	2	59, 31		5–5.5	3.4–3.53	E	IV
586	Bindheimite	591	$Pb^3\,O\,Sb\,O^5+4\,H$	8, 5	70	F	4	4.7	E	A
587	Stibioferrite	Ap. 2–53	$Fe\,O_3,\,Sb\,O^5,\,H$	5	70		4	3.52		A
590	Nitre	592	$K\,O\,N\,O_5$	1	72		2	1.93	E	III.
591	Soda nitre	593	$Na\,O\,N\,O_5$	1	72		1.5–2	2.2	E	VI
592	Nitrocalcite	593	$Ca\,O\,N\,O_5+H$	1, 7					F	M
593	Nitromagnesite	593	$Mg\,O\,N\,O_5$	1						
594	Sassolite	594	$B\,O_3\,3\,H\,O$	5 to 1	31	T	1	1.48	1	V
595	Szaibelyite	594	$3\,Mg\,O\,5\,B\,O_3+4\,H$	1, 5			3–4	3	E	
595	A. Sussexite	Ap. 1–15	$(Mn\,O\,Mg\,O)\,^2B\,O^3+H$	7, 1	70	U	3	3.42	2	
595	A. Ludwiglte	Ap. 2–35	$2\,Mg\,O\,B\,O_3+Fe\,O\,Fe\,O_3$	5, 4, 6	21, 4	70	K. U	5	3.9–4	F M
596	Hydroboracite	595	$3\,CaO\,4BO_3+3MgO4BO_3+$	18 H 1		I	2	1.9–2	E	F
597	Boracite	595	$3\,Mg\,O\,4\,B\,O_3+\frac{1}{2}\,Mg\,Cl$	1, 7, 4	72	4.5–7		2.97	2	I
597	A. Huyssenite	799	$(\frac{1}{2}\,Mg\,O+\frac{1}{2}\,Fe\,O)^3\,4\,B\,O_3$	4, 7, 5	76			2.78		M
598	Rhodizite	596	$Ca\,Na\,2\,B\,O_3+H$ [+7 H	1	72		8	3 3–4	6	I
598	A. Lüneburgite	Ap. 1–10	$2\,(Mg\,O.H)\,P\,O_5+Mg\,O\,B\,O_3$							
599	Borax	597	$Na\,O\,2\,B\,O_3+10\,H$	7, 1	72		2.5	1.72	E	IV
600	Bechilite	597	$(\frac{1}{2}\,CaO+\frac{1}{2}H)\,B\,O_3+1\frac{1}{2}H$						E	
600	A. Priceite	Ap. 2–45	$3\,Ca\,O\,4\,B\,O_3+6\,H$	1, 64				2.26–2.29	3	C
601	Howlite	598	$Ca\,O,\,B\,O_3,\,Si\,O_2\,H$	1	sub. 72		3.5	2.55	E	C
601	A. Winkworthite	Ap. 1–17	Mixture $B\,O_3$	1			2–3		E	
602	Ulexite	598	$Na\,O,\,Ca\,O,\,B\,O_3.H$ [+H	1	79	U	1	1.65	1	F M
603	Cryptomorphite	599	$(\frac{1}{2}(Na\,O\,Ca\,O)+\frac{1}{2}\,H)\,B\,O_3$	1		P			1	
604	Larderellite	600	$N\,H^4\,4\,B\,O_3+4\,H$	1					F	
605	Lagonite	600	$Fe\,O_3\,3\,B\,O_3+3\,H$	5						
606	Warwickite	600	$Mg\,O,\,Fe\,O,\,Ti\,O_2,\,B\,O_3$	8, 2	sub 73	E	3–4	3.4		IV?
610	Wolframite	601	$(Mn\,O\,Fe\,O)\,W\,O_3$	2	2	E	5.5	7.3	3	III.
611	Hübnerite	603	$Mn\,O\,W\,O_3$	8, 3	71	E	4 5	7.1	E	III.
612	Ferberite	604	$(Fe\,O,\,Mn\,O)\,W\,O_3$	2	2	E	5.5	7.3	3	M
613	Megabasite	604	$(Mn\,O,\,Fe\,O)\,W\,O_3$	8	sub. 73	E	3.5–4	6.4–6.9	E	III.
614	Scheelite	605	$Ca\,O\,W\,O_3$	1, 8, 4, 3	72		4.5–5	6	5	II.
615	Cuproscheelite	606	$Cu\,O\,W\,O_3+2\,Ca\,O\,W\,O_3$	39, 4 to 34.35	72	ct	4.5–5		F	G
615	A. Cuprotungstite	Ap. 2–14	$Cu\,O\,3\,W\,O_3$	5, 4	75, 4. 5		4		E	A
616	Stolzite	606	$Pb\,O\,W\,O_3$	8, 5 to 3	70		3	7.9	2	II.
617	Wulfenite	607	$Pb\,O\,Mo\,O_3$	1,3 gen'lly 5	70	B	3	6.9	1.5	II.
617	A. Eosite	Ap. 1–5	$V\,O_3,\,Mo\,O_3,\,Pb\,O$	21. 3	8, 5		3–4			II.
618	Pateraite	608	$Co\,O\,Mo\,O_3$	2					F	A
619	Dechenite	609	$(Pb\,O\,Zn\,O)\,V\,O^5$	3	78		3.–4	5.7	E	M
620	Descloizite	609	$Pb^2\,O_2\,V\,O^5$	34. 8 to 2			3.5	5.8	E	III.
621	Vanadinite	610	$3\,Pb\,O\,V\,O^5+\frac{1}{3}\,Pb\,Cl$	8 or 5	70		2.75–3	6.8	E	VI
622	Volborthite [Copper	611	$Cu\,O\,V\,O^5\,H$	34, 4 to 26, 5	31	D	3–3.5	3.5	E	VI
622	A. Vanadate of Lime &	612	$(Cu\,O,\,Ca\,O)^4\,V\,O_3+aq$		4, 5			3.495		
622	B. Vanadiolite	Ap. 1–16	$3\,R\,O\,Si\,O_2+Ca_6\,(V\,O_4+2\,V\,O_5)$	21, 4	7, 4	72, 75		3.96	F	
623	Chlorite	612	$(Pb^6\,O\,V\,O_3+Cu^6\,O\,V\,O_3$	21, 8, 2					E	
623	A. Vanadate from the Lake Superior Copper Regions	612	$V\,O_3\,Fe\,O_3$ &c	21, 8 or 3, 5						
624	Pucherite	Ap. 1–12	$Bi\,O_3,\,V\,O^5$	3, 8	72, 71	D	4	5.91	E	III.
624	A. Uranosphærite	Ap. 2–57	$Bi\,O_3\,2\,U\,O_3+3\,H$	5	5	Rad	2 3	6.36		
625	Sulphatite	614	$H\,O\,S\,O_3$	23			Liquid.	1.85		
626	Taylorite	614	$(\frac{5}{6}\,K\,O+\frac{1}{6}\,N\,H^4\,O)\,S\,O^3$	5, 1		Cry	2		D	C
627	Aphthitalite	615	$K\,O\,S\,O_3$	1	72		3	1.73	E	III.
628	Misenite	615	$K\,O\,S\,O_3+H\,S\,O_3$	1					E	F
629	Thenardite	615	$Na\,O\,S\,O_3$	1	72		2–3	2 55	E	III.
630	Barite	616	$Ba\,O\,S\,O_3$	1, 5, 6	72	D, W	2 5–3.5	4.5	3	III.
631	Celestite	619	$Sr\,O\,S\,O_3$	23, 1, 6	72	D, W	3–3 5	3.9	3	III.
632	Anhydrite	621	$Ca\,O\,S\,O_3$	1, 7, 57, 3	31, 72	H	3–3.5	2.899	F	III.
633	Anglesite	622	$Pb\,O\,S\,O_3$	1	71	Z	3	6.1–6 3	1.5	III.
634	Binkosite	624	$S\,O_3\,Zn\,O$					4.330		III.
634	A. Hydrocyanite	Ap. 2–29	$Cu\,O\,S\,O_3$	19, 4, 8, 6						III.
634	B. Dolerophanite	Ap. 2–17	$Cu_2\,As\,O_3$	8					F	IV
635	Leadhillite	624	$Pb\,O\,S\,O_3+3\,Pb\,O\,C\,O_2$	1. 5, 7	31 to 70	E	2.5	6.3	1.5	III.

Species No.	SPECIES.	Pages in Dana.	COMPOSITION.	Color.	Streak or Lustre.	Cleavage or Fracture.	Hardness.	Specific Gravity.	Fusibility.	Crystalization.
635	A. Maxite	Ap. 2–38	$PbO\,SO_3.PbO\,CO_2.Pb\,O,H$	....23....	....31....	....Tr...	...2.5–3...	....6.87....	....E....	III..
636	Caledonite	....625...	$\{3\,Pb\,O\,S\,O_3+2\,Pb\,O\}$ $\{C\,O_2+Cu\,O\,C\,O_2\}$	21, 36, or 6,4	....72....	....H....	...2.5–3...	....6.4....	....E....	III..
637	Dreelite	....626...	$Ca\,O\,S\,O_3+3\,Ba\,O\,S\,O_3$	.....1.....	...31, 1...	.....I....	....3.5....	...3.2–3.4...	.....	VI..
638	Susannite	....626...	$Pb\,O\,S\,O_3+3\,Pb\,O\,C\,O_2$	....1, 5, 7....	....70....	..... D....	...2.5....	....6.5....	...1.5....	VI..
639	Connellite	....627...	$Cu\,O\,S\,O_3\,Cu\,Cl$	.....6.....	....72....	.....	.....	.....	.....	VI..
640	Glauberite	....627...	$Na\,O\,S\,O_3+Ca\,O\,S\,O_3$	....5 to 7....	....72....	.....	....2.5....	....2.7....	...1.5....	IV..
641	Lanarkite	....628...	$Pb\,O\,S\,O_3+Pb\,O\,C\,O_2$	4, 1, to 5, 7..	....71....	...D. W.	....2.5....	....6.3–7....	....E....	IV..
642	Crocoite	....628...	$Pb\,O\,Cr\,O_3$	....32, 3....	....72....	.....E....	...2.5–3...	.....6.....	...1.5 ..	IV..
643	Phœnicochroite	....630...	$Pb^3\,O\,Cr^2\,O_3$	....32, 3....	....70....	.....W....	...3.–3.5...	....5.7....	....E....	III?
644	Vauquelinite	....630...	$CuO\,^3Cr^2\,O_3+PbO\,^3Cr^2\,O_3$	..2 to 24, 4...	..71, 70...	.....	...2.5–3...	.....5 6....	....E....	IV..
645	Jossaite	....631...	$Cr\,O_3\,Pb\,O\,Zn\,O$	....72, 59....	.....	.....E....	....3.0....	....5.2....	.....	III..
646	Pettkoite	....631...	$Fe\,O,\,Fe\,O_3,\,S\,O_3$	.....2.....	.....	.....	....2.5....	.....	....I....	...I..
647	Alumian	....631...	$Al\,O_3\,2\,S\,O_3$	.....1.....	....72....	.....	...2.–3...	....2.74....	.....	VI?.
650	Mascagnite	....635...	$N\,H_4\,O\,\,S\,O_3+H$	....1, 7, 5....	....72....	.....	.....2....	....1.7....	....V....	III..
651	Boussingaultite	....635...	$N\,H_4\,O,\,S\,O_3,\,Mg\,O$	.....	.....	.....	.....	.....	.....	Cry
652	Lecontite	....635...	$RO\,SO_3+2\,H$	....23....	....72....	.....	...2–2.5...	.....	....S	III..
652	A. Guanovulite	Ap. 2–64	$\{(N\,H_4\,O\,S\,O_3+2\,K\,O)\ 8\,O_3+3\,(K\,O\,S\,O_3.H\,O\ (S\,O_3)+4\,aq.\}$	.....5, 1.....	....79....	.....	.....2....	..2.3–2.6...	....E....	.....
653	Mirabilite	....636...	$Na\,O\,S\,O_3+10\,H$	.....1.....	....72....	.....	...1.5–2...	....1.48....	....E....	IV..
654	Gypsum	....637...	$Ca\,O\,S\,O_3+2\,H$	....23. 1, 7...	..79. 7..	in 3dirtns	.....2....	.....2.3.....	..2.5–3..	IV..
655	Kieserite	....641...	$Mg\,O\,S\,O_3+H$	.....1.....	....66....	.....	....2.5....	...2.51....	....E....	III..
656	Polyhalite	....641...	$\{K\,O\,S\,O_3+Mg\,O\,S\,O_3\}$ $\{+2\,Ca\,O\,S\,O_3+2\,H...\}$	...5 to 57, 3...	....72....	.....	....2.5....	...2.77....	...1.5....	III?
656	A. Syngenite	Ap. 2–54	$Ca\,O\,S\,O_3\,K\,O\,S\,O_3+H...$	.....6 1, 1....	.....	.....	.....	.....	....F....	IV..
657	Mamanite	....642...	$K\,O,\,Mg\,O\,Ca\,O\,S\,O_3$	.....1.....	....79....	....L. U....	.....	.....	...1.5....	.....
658	Picromerite	....642...	$(K\,O,\,Mg\,O)\,S\,O_3+3\,H...$	.....1.....	....79....	.....	....2.5....	.....	....E....	IV..
659	Bloedite	....643...	$(Mg\,O\,Na\,O)\,S\,O_3+2\,H...$	....1, 56, 3...	.....	.....	.....	.....	....E....	...M..
659	A. Simonyite	Ap. 1–14	$(Mg\,O\,Na\,O)\,S\,O_3+2\,H...$	23 to 6, 4, 5	.....	.....	....2.5....	....2.24 ..	....E....	IV..
660	Loeweite	....643...	$(Mg\,O\,Na\,O)\,S\,O_3+Aq.$	.....5, 1, 3....	....72....	.....	....2.5....	....2.37....	....E....	II..
661	Epsomite	....643...	$Mg\,O\,\,S\,O_3+7\,H$	....23, 1....	....72....	.....	...2.25....	.....1.7.....	....E....	III..
662	auriscite	....644...	$Fe\,O\,S\,O_3+H$	.....4.....	.....	.....	.....2....	....1.8....	.....	III..
662	A. Tecticite	....644...	$S\,O_3\,Fe\,O_3\,H$	....63, 8....	.....	.....	.....	.....	.....	...M..
663	Tauserite	....645...	$Zn^3\,O\,As\,O_5+Zn\,O\,H$	..58 to 45, 5..	....72....	.....ct...	...2.–2.5...	....1.89....	....E....	III..
664	Melanterite	....646...	$Fe\,O\,S\,O_3+7\,H$	.....4.....	.....	.....	.....2....	....1.6....	.....	IV..
665	Pisanite	....646...	$(Fe\,O,\,Cu\,O)\,S\,O_3+7\,H...$	.....6.....	....72....	.....cry....	.....	.....	....F....	.....
666	Goslarite	....647...	$Zn\,O\,S\,O_3+7\,H$	.....1.....	....72....	.....E....	...2.–2.5...	....1.95....	....E....	III..
667	Bieberite	....647...	$Co\,O\,S\,O_3+7\,H$	....48. 53, 3...	....72....	.....	.....	....1.92....	....F....	IV..
668	Morenosite	....648...	$Ni\,O\,S\,O_3+7\,H$	43, 4 to 6, 4..	....72....	.....	.....2....	.....2.....	.....	.....
669	Chalcanthite	....648...	$Cu\,O\,S\,O_3+5\,H$	....40, 6....	.....	.....	....2.5....	....2.21....	....E....	...V..
669	A. Cupromagnesite	Ap. 2–14	$(Cu\,O\,\,Mg\,O)\,S\,O_2+7\,H...$	.....6, 4.....	.....	.....	.....	.....	.....	.....
670	Cyanochroite	....649...	$(\frac{1}{2}\,Cu\,O+\frac{1}{2}\,K\,O)\,S\,O_3+3\,H$	.....6.....	.....	.....	.....	.....	.....	IV..
671	Alunogen	....649...	$Al\,O_3\,3\,S\,O_3+18\,H$	.....5, 3, 1....	....79....	.....	...1.5–2...	....1.7....	.....	IV..
672	Coquimbite	....650...	$Fe\,O_3\,3\,S\,O_3+9\,H$	.....1 to 5.....	.....	.....	....2.5....	.....2.....	.....	VI..
673	Tschermigite	....651...	$\{N\,H_4\,O\,S\,O_3+Al\,O_3\}$ $\{3\,S\,O_3+24\,H.....\}$	....23 to 1...	....72....	.....	....1.–2...	....1.50....	....S	...I..
674	Kalinite	....652...	$KO\,SO_3+Al\,O_3\,S^3\,O_3+24H$	.....1.....	....72....	.....	....2.25...	....1.75....	....E....	...I..
675	Voltaite	....652...	$FeO\,SO_3+Fe\,O_3\,S^3\,O_3+24H$	....2, 21, 4...	....72....	.....	.....	.....	.....	...I..
676	Blakeite	....652...	$Fe\,O_3\,S\,O_3\,H$	.....	.....	.....	.....	.....	.....	...I..
677	Mendozite	....653...	$NaOSO_3+Al\,O_3\,S^3\,O_3+22H$	.....1.....	.....	.....	.....3....	....1.88....	....E....	...M..
678	Pickeringite	....653...	$MgOSO_2+Al\,O_3\,S^3\,O_3+22H$	.....1, 5.....	....79....	.....	.....1....	.....	....E....	IV?.
679	Apjohnite	....653...	$MnOSO_2+Al\,O_3\,S_3\,O_3+24H$	.....1.....	....79....	.....	.....	.....	....E....	...M..
680	Bosjemanite	....654...	$\{Mn\,O\,Mg\,O)\,S\,O_3+Al\}$ $\{O_3\,S_3\,O_3+22\,H.....\}$	.....	.....	.....	.....	.....	....E....	IV?.
681	Halotrichite	....654...	$FeOSO_3+Al\,O_3\,S_3\,O_3+22H$	.....5, 1.....	....79....	.....U....	.....	.....	....E....	...F..
682	Roemerite	....655...	$RO\,SO_3+Fe\,O_3\,S^2\,O_3+12\,H$	.....5, 8.....	.....	.....	....2.75...	....2.17....	.....	IV..
683	Copiapite	....655...	$Fe^2\,O_3\,S^2\,O_3+18\,H$	.....24, 5....	....31....	.....	.....1.5....	.....2.14....	.....	VI..
684	Raimondite	....656...	$2\,Fe\,O_3\,3\,S\,O_3+7\,H$	....45, to 44, 5..	....31....	.....	.....3....	....3.19....	.....	VI..
684	A. Pastreite	....656...	$SO_3\,SiO_2\,As\,O_5\,Fe\,O_3\,Pb\,O\,H$	.....5.....	.....	.....	.....	.....	.....	...A..
685	Fibroferrite	....656...	$3\,Fe\,O_3\,5\,S\,O_3+27\,H$	...1 to 19, 5...	.....	.....	....1.5....	....1.84....	.....	...F..
686	Apatelite	....657...	$3\,Fe\,O_3\,5\,S\,O_3+2\,H$	.....	.....	.....	.....	.....	.....	.....
687	Botryogen	....657...	$Fe\,O,\,Fe\,O_3,\,S\,O_3,\,H$	..44, 5 to 3...	.....	.....	....2.5....	....2.04....	.....	IV..
687	A. Bartholomite	Ap. 2–6	$2NaOSO_3+Fe\,O_3\,S^2\,O_3+2H$	.....	.....	.....	.....	.....	.....	.....
688	Aluminite	....658...	$Al\,O_3\,S\,O_3+9\,H$	.....1.....	....66....	.....	...1.–3...	....1.66....	.....	...M..
688	A. Ettringite	Ap. 2–19	$\{Al\,O_3,\,3\,S\,O_3+6\,(Ca\,O\ (H)+26\,aq.....\}$	.....	.....	.....	...W. E...	.....2.....	....1.75....	.....	VI..
689	Alunite	....658...	$KO\,SO_3+3\,Al\,O_3\,SO_3+5\,H$	.....1, 7.....	....72....	.....D....	...2.5–4...	....2.6....	.....	VI..
690	Löwigite	....659...	$KO\,SO_3+3\,Al\,O_3\,SO_3+9\,H$	....19, 5.....	.....	.....Z....	....3–4...	....2.58....	.....	...M..
691	Jarosite	....660...	$\{(K\,O\,Na\,O)\,S\,O_3+4\}$ $\{Fe\,O_3\,S\,O_3+9\,H.....\}$	.....44, 5.....	.....	.....	.....3.....	.....3.2.....	....F....	VI..
692	Carphosiderite	....661...	$Fe\,O_3,\,S\,O_3\,H$	....46, 5....	....70....	.....	.....4.....	.....2.5.....	.....	...M..
693	Paraluminite	....661...	$Al_2\,O_3\,S\,O_3+15\,H$	...1 to 19, 5...	.....	.....	.....	.....	.....	...M..
694	Pissophanite	....661...	$Al\,O_3,\,Fe\,O_3,\,S\,O_3,\,H$	...19 to 34, 4..	....72....	.....	....1.5....	....1.96....	.....	...A..
695	Felsobanyite	....662...	$Al^2\,O_3\,S\,O_2+10\,H$	.....1, 5	....31....	.....W....	....1.5....	....2.33....	.....	III..
696	Glockerite	....662...	$Fe_2\,O_3\,S\,O_3+6\,H$	...8, 5, 4, 2...	....70....	.....G....	.....	.....	.....	...M..
697	Lamprophanite	....663...	$\{S\,O_3\,Pb\,O\,Mn\,O\,Mg\,O\}$ $\{Ca\,O\,Na\,O\,K\,O\,H....\}$	.....1.....	...31, 1...	.....L....	.....3.....	....3.07....	.....	.....
700	Linarite	....663...	$Pb\,O\,S\,O_3+Cu\,O\,H$	....33, 6....	....72....	.....E....	....2.5....	.....5.4.....	....E....	IV..
701	Brochantite	....664...	$Cu\,O\,S\,O_3+2\frac{1}{2}\,Cu\,O\,H$	...37 to 2, 4...	.....	.....E....	...3.5–4...	...3.4–3.9...	....E....	III..
702	Langite	....665...	$Cu\,O\,S\,O_3+3\,Cu\,O\,H+H..$	.....4. 6.....	.....	.....	...2.5–3...	.....3.5.....	....F....	III..
703	Cyanotrichite	....666...	$S\,O_3,\,Al\,O_3\,Cu\,O,\,H$	.....6.....	....31....	.....	.....	.....	.....	.....

Species No.	SPECIES.	Page in Dana.	COMPOSITION.	Color.	Streak or Lustre.	Cleavage or Fracture.	Hardness.	Specific Gravity.	Fusibility.	Crystallization.
704	Woodwardite	666	$CuOSO_3,CuOH,AlO_3H_3,6H$	6–4, 6						
705	Johannite	666	$\left\{\begin{array}{l}(U_3\,O\,U\,O_3)\,S\,O_3+\frac{1}{8}\\ Cu_3\,O\,S\,O_3+1\frac{1}{2}\,H\end{array}\right.$	37, 4	72	72	2–2.5	3.19	F	IV
706	Uranochalcite	667	$\left\{\begin{array}{l}(\frac{1}{2}(U_3O\,U\,O_3)+\frac{1}{2}\,Ca_3\,O)\\ S\,O_3+\frac{1}{2}Cu0\,SO_3+9H\end{array}\right.$	38, 4			2–2½			M
707	Medjidite	667	$U\,O_3S\,O_3+Ca_3O\,S\,O_3+15\,H$	83		J	2.5			
708	Zippeite	667	$U\,O_3,\,S\,O_3,\,H$	5	79		3			
709	Voglianite	668	$(U_3\,O\,U\,O_3)^2S\,O_3+2\,H$	39 to 36,4	19, 4					A
710	Uraconite	668	$U_3\,O_3\,S\,O_3+14\,H$	26 5						
711	Montanite	668	$Bi\,O_3\,Te\,O_3+2\,H$	5, 1			soft		E	M
712	Kerstenite	669	$Se\,O_3,\,Pb\,O$	24, 5	72, 78	ct. F	3–4		E	VI
715	Calcite	670	$Ca\,O\,C\,O_2$	23, 1, and —	72	I	3	2.6–2.8		VI
716	Dolomite	681	$Mg\,O\,C\,O_2+Ca\,O\,C\,O_2$	1, 7, 8, etc	72 to 81	I	3.5–4	2.8–2.9		
717	Ankerite	685	$\left\{\begin{array}{l}CaO\,C\,O_2+(MgO,\,FeO,\\ Mn\,O)\,C\,O_2\end{array}\right.$	1, 7, 3	72	I	3.5–4	2.95–3.1		VI
718	Magnesite	685	$Mg\,O\,C\,O_2$	1, 5, 7, 8, 4	72	I	3.5–4.5	3.–3.1		VI
719	Mesitite	687	$2\,Mg\,O\,C\,O_2+Fe\,O\,C\,O_2$	5, 1, 7, 8	72 to 81	I	4–4.5	3 35		VI
720	Pistomesite	688	$Mg\,O\,C\,O_2+Fe\,O\,C\,O_2$	5, 1 to 5, 7	31	I. C	3.5–4	3.41		VI
721	Siderite	688	$\left\{\begin{array}{l}Fe\,O\,C\,O_2\text{ (with Mn O,}\\ Ca\,O\,Mg\,O)\end{array}\right.$	47, 7 to 8, 3	72 to 81	I	4	3.6–3.9	4.5	VI
722	Rhodochrosite	691	$Mn\,O\,C\,O_2$	53, 3, 7, 8	72 to 81	I	3.5–4.5	3.5		VI
723	Smithsonite	692	$Zn\,O\,C\,O_2$	1, 7, 4, 6, 5, 3	72		5	4.4		VI
724	Aragonite	694	$Ca\,O\,C\,O_2$	23, 1, 5, 3, 6	72		3.5–4	2.9–3		III
725	Manganocalcite	697	$2MnO\,CO_2+(CaOMgO)CO_2$	66, 3	72		4–5	3.037		Col.
726	Witherite	697	$Ba\,O\,C\,O_2$	1, 7	72		3.5	4–3	2	III
727	Bromlite	698	$Ba\,O\,C\,O_2+Ca\,O\,C\,O_2$	1, 23, 7, 19, 9	72	C. H	4–4.5	3 718	6	III
728	Strontianite	699	$Sr\,O\,C\,O_2$	1, 7, 5, 4	72	E	3.5–4	3.7	6	III
729	Cerussite	700	$Pb\,O\,C\,O_2$	1	72 to 71	Z.	3.5	6.4	E	III
730	Barytocalcite	701	$Ba\,O\,C\,O_2+Ca\,O\,C\,O_2$	1, 7, 5, 4	72	E	4	3.6	6	IV
731	Parisite	702	$\left\{\begin{array}{l}(Ce\,O,\,La\,O,\,DiO)\,C\,O_2+\\ \frac{1}{2}\,(Ca,\,Ce)\,Fl\end{array}\right.$	8, 5	70	D	4.5	4.35		VI
732	Kischtimite	703	$3\,La\,O\,C\,O_2+Ce_2(Fl\,O)^3+H$	21, 8, 5	72, 78			2 784		A
732	A. Bastnäsite	Ap. 1–2	$Ce\,Fl+2\,(Ce\,O,\,La\,O)\,C\,O_2$	59 5	78	ct	4	4.93		III?
733	Phosgenite	703	$Pb\,O\,C\,O_2+Pb\,Cl$	1	71	3 cleav.	3	6.2	E	II
735	Teschemacherite	705	$(\frac{1}{2}\,N\,H_4\,O+\frac{1}{2}\,H\,O)\,C\,O_2$	5, 1			1.5	1.45	V	
736	Natron	705	$Na\,O\,C\,O_2+10\,H$	7, 1	77		1.5	1.4	E	IV
737	Thermonatrite	705	$Na\,O\,C\,O_2+H$	7, 1			1.5	1.5–1 6	E	III
738	Trona	706	$2\,Na\,O\,3\,C\,O+4\,H$	7, 1			2.5–3	2.11	E	IV
739	Gay-lussite	706	$NaO\,C\,O_2+CaO\,C\,O_2+5H$	1	72, 31		2.–3	1.99	E	IV
740	Hydromagnesite	707	$3\,(Mg\,O\,C\,O_2+H)+MgO\,H$	1	79. 66		3.5	2.1		IV
741	Hydrodolomite	708	$(Ca\,O\,Mg\,O)\,C\,O_2+\frac{1}{2}\,H$	5, 7, 4, 1	72			2.5		M
742	Predazzite	708	$2\,Ca\,O\,C\,O_2+Mg\,O\,H$	1 to 7, 1	72		3.5	2.63		M
743	Pencatite	708	$Ca\,O\,C\,O_2+Mg\,O\,H$	6, 7	72		3	2.5		
744	Hovite	709	$(\frac{1}{2}\,Ca\,O+\frac{1}{2}\,H)\,C\,O_2+aq$	1		G	soft			
745	Lanthanite	709	$La\,O\,C\,O_2+3\,H$	7, 1, 9, 5	31 or 66	Mi	2.5–3	2.666		III
746	Tengerite	710	$Yt\,O,\,C\,O_2$	1	66					
747	Zaratite	710	$Ni\,O\,C\,O_2+2\,Ni\,O\,H+4\,H$	37, 4	72		3.–3.25	2.6		S
748	Remingtonite	711	$Co\,O\,C\,O_2\,H$	1	19, 53		soft			
749	Hydrozincite	711	$Zn\,O\,C\,O_2+2\,Zn\,O\,H$	1, 7, 5	66		2.–2.5	3.7		M
750	Aurichalcite	712	$Cu\,O,\,Zn\,O,\,C\,O_2,\,H$	6, 4	31		2		D	
750	A. Zinkazurite	713	$S\,O_3,\,Zn\,O,\,Cu\,O,\,C\,O_2,\,H$	6				3.49		Cry
751	Malachite	713	$Cu\,O\,C\,O_2+Cu\,O\,H$	38 to 37, 4	79 to 77	U	3.5–4	3.8	2	IV
751	A. Mysorin	715	$C\,O_2,\,Cu\,O\,Fe\,O_3$	2, 8		Z	soft	2.62		M
751	B. Lime Malachite	715	$C\,O_2,\,Cu\,O,\,S\,O_3,\,Ca\,O\,Fe\,O_3$	36, 4	79	L, U	2.5			M
752	Azurite	715	$2\,Cu\,O\,C\,O_2+Cu\,O\,H$	6	72		4	3.7	2	IV
753	Bismutite	716	$Bi\,O_3,\,C\,O_2,\,H$	1 to 5	66		4–4.5	6.8–7.6	E	A
754	Liebigite	717	$U\,O_3\,C\,O_2+CaO\,C\,O_2+20H$	43, 4		cry	2–2.5			
755	Voglite	717	$\left\{\begin{array}{l}2\,U\,O\,C\,O_2+2CaO\,C\,O_2\\ +3\,Cu\,O\,2\,CO_2+14\,H\end{array}\right.$	37, 4	31					
755	A. Schröckeringite	Ap. 2–50	$C\,O_2\,U\,O\,H$	4, 5						
756	Whewellite	718	Oxalate of Ca O			Z	2.5–2.7			IV
757	Thierschite	718	Oxalate of Ca O							
758	Humboldtine	718	Oxalate of Fe O	5	66, 70	G. H	2	2.13–2.48	E	C

(*VI.*) *Hydrocarbon Compounds.*

761	Tetrylic Hydrid	720	Petroleum Oils							
762	Pentylic Hydrid	720								
763	Hexylic Hydrid	720								
764	Heptylic Hydrid	720								
765	Octylic Hydrid	720								
766	Nonylic Hydrid	720								
767	Beta-Naphtha Group	720								
768										
769										
770										
771										
772	Scheererite	727	$C\,H_4$	1, 7, 5, 4, 3	31		soft	1–1.2	E	IV
773	Chrismatite	728	$C_2\,H_6$	4 to 59.5	78 to 79				E	

Species No.	SPECIES.	Page in Dana.	COMPOSITION.	Color	Streak or Lustre.	Cleavage or Fracture.	Hardness.	Specific Gravity.	Fusibility.	Crystalization.
774	Decatylene	729								
775	Eudecatylene	729								
776	Dodecatylene	729	Petroleum Oils							
777	Decatritylene	729								
778	Urpethite	731	C H	8, 5			soft	0 885	E	
779	Hatchettite	731	C H	5, 1	74, 31		soft	0.916	E	M.
780	Ozocerite	732	C H	23 to 1			soft	0.85–0.90	F	
781	Zietrisikite	733	C H	8			soft	0.9	E	
781	A	733–4	C H	21, 8			soft	0.955	E	
781	B. Neft-Gil	734	C H	8				0.956	E	
781	C. Pyropissite	734	C H	7, 8				0.49–0 52	E	
782	Elaterite	734	C H				soft	0.905–1.23	E	M.A
783	Settling Stones Resin	735	C H	5				1.16–1.54	E	
784	Fichtelite	735	C_5 H_3	1	78		1		E	IV.
785	Hartite	736	C_9 H_{16}	1	78		1		E	IV.
786	Dinite	736	C H	1 to 5					E	
787	Ixolyte	736	C H	32, 3	78	J	1	1.008	E	A.
788	Benzole	737								
789	Toluole	737								
790	Xylole	737	Benzole Group							
791	Cumole	737								
792	Cymole	737								
793	Könlite	737	C, H	3, 8, 5			soft	0 88	E	A. S
794	Naphthalin	738	C_{10} H_8	1	75, 74			1.153	F	III.
795	Idrialite	738	C_3 H_2	1					F	
795	A. Aragotite	Ap. 2–4	C, H	5					V	
796	Geocerite	738	C_{28} H_{56} O_2	1			soft		E	
797	Geomyricite	739	C_{34} H_{68} O_2	1		C	soft		E	
798	Copalite	739	C 85.5 H 11.5 O 3 %	5, 7, 21, 8				1.010	E	
799	Succinite	740	C_{78} H_{10} O_{11}	5	71		2–2 5	1.065–1 081	E	M.
799	A. Krantzite	741	C_{40} H_{64} O_4	5				1.002	F	
799	B. Ambrosine	Ap 1–1	C, H, O	5 to 63, 8	70	Z			F	M.
800	Wolchowite	741	C 80.5 H 10.5 O 9 %	5	70		1.5–2	1 0	E	M.
801	Bucaramangite	741	C 82.5 H 11 O 6.5 %	19, 5				1	E	
802	Ambrite	741	C 77 H 10.5, O 12.5 %	7, 5	78	Z		2	1.034	A.
803	Bathvillite	742	C_{30} H_{50} O_3	66, 8				1.01		A.
804	Torbanite	742	C_{40} H_{68} O_2				2, 25	1.18		
805	Xyloretinite	742	C_{20} H_{17} O_4	1				1.115		M
805	A. Bombiccite	Ap. 2–8	H_{13} O C_7	23			0.5–1	1.06	F	II.
806	Leucopetrite	743	C_{50} H_{84} O_3	1					F	
807	Euosmite	743	C 82 H 12 O 6 %	5, 8		F	1.5	1 2–1.5		M.A
807	A. Rosthornite	Ap. 1–14	C_{24} H_{40} O	8	78			1.076		M.
808	Scleretinite	744	C 77, H 9, O 10.3 %	2		Z	3	1.136	E	
809	Pyroretinite	744	C_{40}, H_{56}, O_4						E	
810	Reussinite	744	C 40, H 56, O 3 5 %	8, 3					E	
811	Rochlederite	744	C H O	3, 8					E	
812	Schlanite	745	C 81.5, H 9 O 9.5 %	8						
813	Guyaquillite	745	C_{40} H_{52} O_6	19, 5				1.092	E	A.
814	Middletonite	745	C_{40} H_{44} O_2	3, 8		F		1.6	E	M.
815	Stanekite	745	C_{39} H_{44} O_6							
816	Anthracoxenite	746	C_{40} H_{33} $O_7\frac{1}{2}$	2					E	
817	Tasmanite	746	C 40, H 62, O 2 %	3, 8		Z	2	1.18	F	
818	Dysodile	746		5, 4, 7				1.14–1.25		
819	Hircite	747		8		Z			F	A.
820	Baikerinite	747							F	
820	A. Dopplerite	747		7			soft			
821	Butyrellite	747	C_{32} H_{64} O_4	1			soft		2	
822	Geocerellite	748	C_{28} H_{56} O_4	1		F			E	
823	Brücknerellite	748	C_{24} H_{44} O_8							
824	Succinellite	748	C_4 H_6 O_4	23, 1			1	1.55		III.
825	Retinellite	748	C_{21} H_{23} O_3	8						
826	Dopplerite	749	C_{10} H_{12} O_5	8, 2			0.5	1.089		A.
827	Melanellite	750	C 66, H 4.6 O 29 %	2						
828	Mellite	750	AlO_3 3 Mellitic acid + 18 H	45, 5		Z, X	2–2.5	1.55–1.65		II.
829	Pigotite	750	4 AlO_3 + C_6 H_{10} O_4 + 27 H							
829	A. Organic Salts of Iron	750	Fe O_3 &c.							
830	Asphaltum	751	C_{40} H_{64} O_6	8, 2 & 2				1–1.8	E	A.
830	A. Grahamite	753	C, H, O	2			2	1.145	F	
830	B. Albertite	753	C 86 H 9 O 2 N 3 %	2			1–2	1.097	E	
830	C. Piauzite	753		8, 4, 2			1.5	1.220	E	
830	D. Berengelite	753	C_{40} H_{62} O_8	8, 2					E	
831	Mineral Coal	753	C &c.	2		Z. H	0.5–2.5	1–1 80		C. M
832	Azorite	761	Cb O_5 Ca O O?	1			4–4.5			II.
833	Brewsterlinite	761		23						
834	Cryptolinite	762		23						
835	Hessenbergite	762	SiO_3 &c	6			7–7.5			IV.
836	Parathorite	763		3 to 2			5–5.5		6	III.
837	Pyrrhite	763	Cb O_5 Zr O ?	56, 5			6			I.
834	? Alurgite	764	Mn &c							

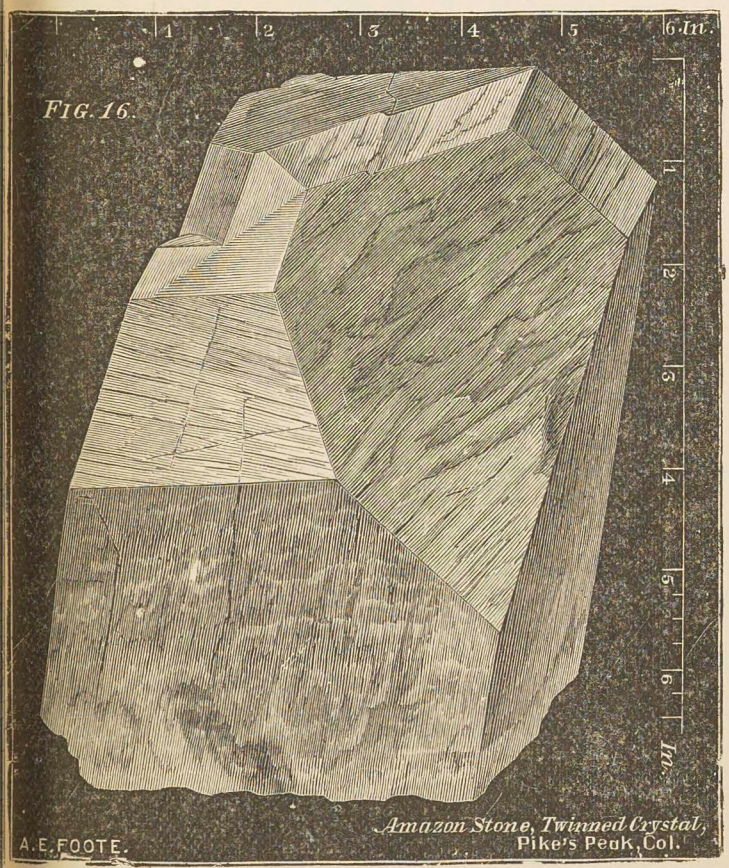
REFERENCES.—Pages alone refer to Dana's Mineralogy Ap. means appendixes to Dana, and the first number following indicates the Appendix—1, 2, or 3. The second number indicates the page. Sm. indicates Dana's report on Mineralogy in the Smithsonian Annuals for 1883, '84, '85. A.J. indicates the Am. Jour. of Sciences and Arts, and is followed by the number of the Volume and Page. For other abbreviations see "Table of Mineral Species."

NEW SPECIES NAMES.	References.	Composition in percentage or Formulæ.	Color.	Streak and Lustre.	Cleavage and Fracture.	Hardness.	Specific Gravity.	Fusibility.	Crystallization.
Abriachanite	Ap. 3-1	$Fe_2O_3$15, FeO10, MgO11, Na_2O7, H_2O5	75, 6	77	U		3.326	inf.	A.
Achrematite	Ap. 3-1	3(3 $Pb_3As_2O_8$ + $PbCl^2$ + 4 (Pb_2 MoO_5)	19,24,5,-56,3	19,8,70-71	H to sub Z	3-4	5.96-6.17	E.	M.
Aerinite	Ap. 3-2	$SiO_2$49, $Al_2O_3$8, Fe_2O_3-FeO33, CaO4 H_2O6 etc.	75, 6	77		3-4	3.018		M.
Agnesite	793	Bi etc					4.31		
Ajkite	Ap. 3-3	A resin near Amber.							
Alaskaite	Ap. 3-3	(Ag_2Cu_2Pb) S+Bi_2S_3	1,11-7	73			6.878		M.
Allaktite	Sm. '84	$Mn_3As_2O_8$ + 4 H_2MnO_2	3, 5, 6, 4	72	Spli	4-5	3.83-3.85		IV
Amblystegite	Ap. 1-1	SiO_2 50, $Al_2O_3$6 FeO 26, MgO18	8-3, 8	4, 7, 71, 72	Z	7	3.454	5	III
Andrewsite	Ap. 1-1	3 ($Fe_2O_3PO_5$, 3 Fe_2O_3, 3 H_2O)+3 CuO, PO_5	6, 4				3.475		F. R
Antillite	Ap. 1-1	$SiO_2$39, MgO36, FeO6.7, H_2O16.79	21, 4, 8	80	U	3.5-4	2.52		
Annerödite	Ap. 3-7	$R_2Cb_2O_7$ + 2½ aq	2	73-Sub 73	Sub Z	6	5.7	6	III
Anomite	Ap. 3-77	$Si_6Al_6K_4H_2O_{24}$ + $Si_6Mg_{12}O_{12}$				A	biotite	mi	ca.
Arequipite	Ap. 3-9	PbO SbO SiO_2	45, 5		Z	6		D	
Argentobismutite	A.J.31, 229	Ag_2S + Bi_2S_3							
Argyrodite	A.J.32, 163	S 17, Germanium 7, Ag 75.	12, 7, 3	7, 2, 74, 73	F	2.5	6.09-6.11		IV
Arseniopleite	A.J.35, 416	$As_2O_5$45, MnO28, $Fe_2O_3$4, PbO_5 CuO8	3, 8		nod.				
Atopite	Ap. 3-10	$R_2Sb_2O_7$	5-70, 8	78		5-5.6	5.03	F	I
Auerlite	A.J.36, 461	$ThO_2(SiO_2)_2P_2O_5)2H_2O$	5, 1-56, 3			2.5-3	4.4-4.7		II
Barcenite	Ap. 3-11	Sb50, S3, Hg21, Ca4, O18, H_2O4	2, 7	66,77-47,7	=	5.5	5.343	6	M.
Barylite	Ap. 3-12	Ba_4 (Al_2)$_2$ Si_2O_{24}	23	78		7	4.03		E.
Barysil	A.J.35, 417	3 PbO, 2 SiO_2	1			3	6.11-6.55		VI
Beegerite	Ap. 3-13		7	73	A		7.273		I
Belonesite	A.J.35, 417	Mg O, Mo O_2			acic.				II
Bementite	A.J.35, 417	2 (H_2Mn) O, SiO_2	7, 5		fria. L.		2.981		St.
Bertrandite	Sm. '83	2 Be_2SiO_4 + H_2O	23-5	72, 75		6	2.59		III
Beryllionite	A.J.37, 23	Na Be PO_4	1	72-75	W Z	5.5-6	2.84		III
Blomstrandite	Ap. 3-16	Cb_2O_5 Ta_2O_5 50, TiO 11, UO24, H_2O8 +	2	72		5.5	4.17-4.25	D.	M.
Brackebuschite	Ap. 3-36	$R_2V_2O_8$ + H_2O	2						E.
Bravaisite	Ap. 3-18	$R_2(Al_2)_2Si_2O26$ + 8aq	4-7, 4	66	L	1-2	2.6	1	III
Bröggerite	Sm. '84	$U_2O_3$80, PbO8.5, ThO5.5+	13, 2			5-6	8.73		I
Buckingite	A.J.36, 156	2$Fe_2(SO_4)_4$ + 2H_2SO_4 + 7 Fe SO_4 + 60aq	21, 8		Tr.				V
Cacoclasite	This Cat	SiO_2 37, Al_2O_3 20, Ca O 38 +	1	1, 70-72	G	5-6	3.05	3	II ?
Calcozincite	Ap. 3-20	ZnO81, CaO8, $CO_2$6, H_2O4.	69, 56, 5		Colum.	3.5	3.95		G
Cappelenite	Sm. '85	$SiO_2$14, $B_2O_3$17, $Y_2O_3$53, La_2 (Di_2) $O_3$3, Ba O8	8	78			4.407		VI
Caryinite	Ap. 3-20	$R_3As_2O_8$, (R=PbO, MnO)	8-5, 8	5, 1, 78	Splint.	3-3.5	4.25		M.
Catlinite	795	$SiO_2$55, $Al_2O_3$18, $Fe_2O_3$6, Na_2O K_2O12 +	3	3	G	soft			A.
Chalcomenite	Ap. 3-23	Cu SeO_3 + 2 aq	75, 6	trans				F.	IV
Chalcophanite	Ap. 3-23	(MnZn)O+2MnO_2+2aq.	6, 2-13, 2	8, 73, 75	M. I.	2.5	3.907	6	VI
Chloralluminite	Ap. 3-25	(Al_2Cl_6 + xH_2O)							
Chloromagnesite	Ap. 3-25	($MgCl_2$ + x aq)	23-1	72-66	L to U	1-2	1.65		
Chlorothionite	Ap. 3-25	K_2SO_4 + Cu Cl_2	75, 6						
Chlorotile	Ap. 3-26	$Cu_3As_2O_8$ + 6 aq	19, 4-37, 4						III M
Cleveite	Ap. 3-27	U_2O_3 42, Y_2O_3 7, ThO_2 5, Pb O 11, U O 24, etc	13, 2	2, 8, 66		5.5	7.49	inf.	I
Cliftonite	A.J.34, 232	C	2			2.5	2.12		I
Clinocrocite	Ap. 3-28	Al_2O_3, Fe_2O_3, Na_2O, K_2O. SO_3, H_2O	Saff, 5						IV
Clinophaeite	Ap. 3-28	SO_3 37, Fe_2O_3 9, FeO 6, K_2O22, H_2O15	2, 4	7, 4, 72		?	2.979		IV
Cobaltomenite	Sm. '82	Co Selenite	53, 3						Cry.
Colemanite	Sm. '84	2 Ca O, 3 B_2O_3 + 5 H_2O	1-23	1, 81	Cld. W	4	2.43		IV
Coloradoite	Ap. 3-29	Hg Te	13, 2	73	H to sub Z	3	8.627	1	M.
Coronguite	Ap. 3-30	Sb_2O_5 59, Pb O21, Ag_2O8, H_2O11	7, 5	70	G	2.5-3	5.5		A.
Cossyrite	Ap. 3-31	SiO_2 44, Fe_2O_3 8, Al_2O_3 5, Fe O 33, Na_2O5	2		E & Ct		3.74	1	V
Cryphiolite	A.J.35, 417	P_2O_5 49, Mg O 34, CaO 15	45, 5		Tr.		2.674		IV
Crystobalite	A.J.34, 73	SiO_2	1			7		inf.	I
Cuprocalcite	Ap. 3-32	($Cu_2O)_2$ CO_2 + 2 Ca CO_3 + H_2O				3	3.9		M.
Cuspidine	Ap. 3-33	Ca_2SiO_4 + Ca F_2	19, 53, 3		D	5-6	2.853	D.	III
Cyprusite	Ap. 3-33	Fe_2O_3 51, SO_3 21, H_2O	5			2	1.7		
Dahllite	A.J.37, 77	4 $Ca_3P_2O_8$ + 2 $CaCo_3$ + H_2O	19, 5, 1-3, 5	66	U	5	3.053		

NEW SPECIES NAMES.	References.	Composition in percentage or Formulæ.	Color.	Streak and Lustre.	Cleavage and Fracture.	Hardness.	Specific Gravity.	Fusibility.	Crystallization.
Daubréelite	Ap. 3-34	$FeS + Cr_2S_3$	2	2-73, 75	H		5.01	inf.	M.
Daubreite	Ap. 3-35	$4(Bi_2O_3) + Bi_2Cl_6$	5-7, 1		G	2-2.5	6.4	4	A.
Davreuxite	Ap. 3-35	$H_4(Mn\,Mg)(Al_2)_3Si_6O_{24}$	1-48, 3		trans			inf.	III
Dawsonite	Ap. 2-16	Al_2O_3 33, Na_2O 20, CO_2 30, H_2O 12	1	72	U	3	2.40		IV
Destinezite	Ap. 3-36	$P_2O_5\,As_2O_5\,V_2O_5\,Fe_2O_3\,Al_2O_3$ CaO +	5, 1	66	G				M.
Diabantite	Ap. 3-37	SiO_2 34, Al_2O_3 11, FeO 25, MgO 17, H_2O 10	21, 4			1	2.79		M.
Diadelphite	Sm. '84	Mn Arsenate + 2 aq	3 or 8, 3	69, 8		3.5			VI
Dickinsonite	Ap. 3-37	$4R_3P_2O_8 + 3$ aq	34-38, 4	1, 72, 31	H	3.5-4	3.34	2	IV
Dietrichite	Ap. 3-38	$(Zn\,Fe\,Mn)SO_4 + Al_2S_3O_{12} +$ 22 aq	22, 1-8, 5	79		2		F.	IV
Dihydrothenardite	A.J. 35, 418	$Na_2SO_4 + 2$ aq							IV
Dumortierite	Ap. 3-39	$(Al_2)_4Si_3O_{18}$	69, 6-21, 6	79	U			inf.	F.
Duporthite	Ap. 3-39	SiO_2 49, Al_2O_3 27, FeO 6, MgO 11, H_2O 4	4-8, 7	79		2	2.78		F.
Durfeldtite	Ap. 3-40	3 PbAgS + Sb_2S_3	69, 7	73		2.5	5.40		M.
Duxite	Ap. 3-40	C 78, H 8, O 13, S .42	21, 8				1.133	1	
Dysanylite	Ap. 3-40	$RCb_2O_6 + 6RTiO3$, R = Fe, Ca, etc	2		A		4.13		I
Edisonite	A.J. 36, 272	TiO_2	15-5	5, 1, 70. 71	Small Z	6	4.216	Inf.	III
Eggonite	Ap. 3-40	$CdSiO_3$	69, 7, 8	Sub. 71		4-5			V
Ekdemite	Ap. 3-41	$Pb_5As_2O_3 + 2\,PbCl_2$	75, 5-4	72-78	F	2.5-3	7.14	E.	II?
Elpasolite	Sm. '85	F 47, Al 11, K 29, Na 10	23		S				I
Elrouquite	Ap. 3-41	Al_2O_3 16, Fe_2O_3 14, SiO_2 16, P_2O_5 32 H_2O 22	43, 4-7	66	Z	6	2.35		Am.
Emmonsite	A.J. 31, 476	Te 58.75, Se 0.53, Fe 14.29, H_2O ?	5, 4		T		5		IV?
Empholite	Sm. '83	$Al_2O_3\,3SiO_2$ + aq	1	75	W	6		inf.	III
Endlichite	Sm. '85	$Pb_5Cl(AsO_4)_3 + Pb_5Cl(VO_4)_3$	5, 1-56, 3				6.864		VI
Enysite	Ap. 3-42	SO_3 8, Al_2O_3 30 Cu O 17, SiO_2 3, H_2O 14, +	6, 4			2-2.5	1.59		S
Erythrozincite	Ap. 3-43	Mn Zn S	2	19, 5				F	
Eucrasite	Ap. 3-43	SiO_2 16, ThO 36 +	2, 8	8, 78	H	4.5-5	4.39	4	III
Eucryptite	Ap. 3-44	$Li_2(Al_2)Si_2O_8$	1		D		2.667		VI
Fairfieldite	Ap. 3-45	$Ca_3(Mn_2\,Fe_2)P_2O_8 + 2$aq	1-19, 46, 5	1, 31, 8. 71	W	3.5	3.15	4.15	V
Fiedlerite	A.J. 35-418	Near Laurionite			Tr				IV
Fillowite	Ap. 3-47	3 (Mn Fe Ca Na_2) P_2O_8 + aq.	59, 5-3, 8	1, 70-78	H	4.5	3.43	1.5	IV
Franklandite	Ap. 3-48	$Na_4Ca_2B_{12}O_{22}15\,H_2O$	1		U	1	1.65	E	M F
Freyalite	Ap. 3-48	SiO_2 2), Ce_3O_4 29, ThO 28, etc.	8	5, 7, 70			4.06-4.17	inf.	
Friedelite	Ap. 3-48	$Mn_4Si_3O_{10}2\,H_2O$	53, 3	19, 3	D W	4-5	3.07	E	VI
Galenobismutite	Ap. 3-49	Pb Bi S_4	14, 1	7, 2, 73		3-4	6.88	E	M.
Ganomalite	Ap. 3-49	(Pb Mn) SiO_3	1-1, 7	78		4	4.98	E	M.
Gedanite	Ap. 3-51	C 81, H 11, O 7, S .25	19-5		Z	1.5-2	1.06	E	
Gerhardtite	Sm. '85	$4CuO, Na_2O_3, 3H_2O$	21-4	69, 4, 82	D W	2	3.426		III
Ginilsite	Ap. 3-51	$R_8(R_2)_2Si_7O_{28} + 2$ aq	7, 5				3.404	D	M.
Guanajuatite	Ap. 3-53	Bi_2Se_3	2	66	G	3.5	6.62		Am
Goyazite	Sm. '84	Ca Al phosphate + aq	5, 1		Ct	5	3.26		
Guejarite	Ap. 3-54	$Cu_2S + 2Sb_2S_3$			W	3.5	5.03	F	III
Guitermanite	Sm. '84	10 Pb S 3 As_2S_3	6, 7	73		3	5.94		
Hanksite	Sm. '85	$4Na_2SO^4 + Na_2CO^3$	23, 1-21	72	H	3-3.5	2.56		VI
Hannayite	Ap. 3-55	$H_4(NH_4)Mg_3P_4O_{16} + 8$ aq			D W		1.89	F	V
Hatchettolite	Ap. 3-56	$(Ta_2O_5Cb_2O_5)67, UO_3$ 16 CaO 8, +	5, 8	70	Sub Z	5	4.77-4.90		I
Heldburgite	Ap. 3-56	Composition unknown	5	1, 71				inf.	II
Hemafibrite	Sm. '84	Mn Arsenate	21, 3		U				IV
Henwoodite	Ap. 3-57	P_2O_5 49, Al_2O_3 18, CuO 7%	6, 4	1, 6, 4	Z	4-4.5	2.67		bot
Herrengrundite	Ap. 3-57	Basic Cu Sulphate	37, 4-6, 4	69, 4, 72	D W	2.5	3.132		IV
Hetaerolite	Ap. 3-58	ZnO Mn_2O_3	2	8, 2-Sub 73	Rad.	5	4.933	inf.	bot
Heubachite	Ap. 3-58	$3R_2O_3 + 4$aq. R = C O Ni Fe Mn	2	Sub 73		2.5	3.44	inf.	
Hofmannite	Ap. 3-59	$C_{20}H_{36}O$	23		Tr				
Hohmannite	A.J. 36-156	$2Fe_2O_3.3SO_3 + 13H_2O$	8		U	3	2.24		F
Homilite	Ap. 3-59	$FeCa_2B_2Si_2O_{10}$	2 or 8, 2	7, 70, 72	J	4.5-5	3.34	3	IV
Horsfordite	A.J. 36-156	$Cu_{11}Sb_2$	68, 1	high		4.5	8.812		M.
Hyalotekite	Ap. 3-60	SiO_2 40, PbO 25, BaO 21, CaO 7, +	1-36, 7	72-78	Ct	5-5.5	3.81	F	Cry
Hydrocerussite	Ap. 3-61	$2PbCO_3 + H_2O$?	1-23		Ct	1			VI?
Hydrocuprite	Ap. 2-28	$CuOH_2O$	56, 5-56, 3			soft			A
Hydrogiobertite	Sm. '85	$Mg_2CO_4 + 3$ aq	69, 7		S		2.149-2.174		
Hydrorhodonite	Ap. 3-61	Rhodonite + aq	3, 8	8, 1, 72	Ct	5-6	2.70	E	Cry
Hydrotitanite	Catal. 53	$TiO_2\,H_2O$ (Vd Ca Mg Fe O)	5, 7			2	3.68		P
Ihleite	Ap. 3-62	$Fe_2S_3O_{12} + 12H_2O$	5				1.812		A
Ilesite	Ap. 3-62	$RSO_4 + 4$ aq. R = Mn Zn Fe	1						Cry
Iodobromite	Ap 3-63	2 Ag (Cl Br) + AgI	24, 5, 4		B		5.713	F	I
Ionite	Ap. 3-63	Hydrocarbon	8, 5	66	Am			1	A
Jeremejeffite	Sm. '83	$Al_2O_3BO_3 + FeO$	23	72		6.5	3.28		VI
Kentrolite	Ap. 3-65	$Pb_2(Mn_2)Si_2O_9$	21, 3, 8		E & Ct	5	6.19	F	III
Konickite	Sm. '84	$Fe_2P_2O_8 + 6H_2O$	23	72		3.5	2.3	E	IV
Krennerite	Ap. 3-66	Te Au Ag Cu	68, 1-69, 5	73, 75	D E				III?
Krönnkite	Ap. 3-66	$CuOSO_3 + Na_2OSO_3 +$ aq	33, 4	72	Ct		2.5		V?
Laubanite	A.J. 35-418	$2CaSiO_3 + Al_2(SiO_3)_3 + 6H_2O$	61, 1		U rad.	4.5-5	2.33		
Langbanite	A.J. 34-72	$3MgCO_3, Mg(OH)_2 + 21H_2O$	13, 2	8, 73	Z	6.5	4.918		VI
Lansfordite	A.J. 36-155	CO_2 18.90, MgO 23.18, H_2O 57.79	1, trans.	72	Cry	2.5	1.54-1.692		S
Laurionite	A.J. 35-418	$Pb(OH)_2\,PbCl_2$	1		E	3.5			III
Lautite	Ap. 3-67	Cu As S	13, 2	2, 73	U Rad.	3-3.5	4.96	E	III

NEW SPECIES NAMES.	References.	Composition in percentage or Formulæ.	Color.	Streak and Lustre.	Cleavage and Fracture.	Hardness.	Specific Gravity.	Fusibility.	Crystallization.
Lävenite	Sm. '85	SiO_2 34, ZrO_2 32, Fe_2O_3 6, MnO 5, CaO 11	21, 8–5	W	3, 51				IV
Lawrencite	Ap. 3–67	Fe_2Cl_2.							
Leidyite	Ap. 3–68	$R_2(Al_2)Si_5O_{15}+5$ aq	38, 6–34, 4	1, 70	T	1–2		4	S
Leucochalcite	Ap. 3–69	$Cu_4As_2O_9+3H_2O$	4, 1	79				F	Cry
Leucotile	Ap. 3–69	$R8(R_2)Si_4O_{19}$ 8aq. R=Mg, Fe	4	78				F	III?
Liskeardite	Ap. 3–70	$(Al_3Fe_2)_3As_2O_{14}16H_2O$	1		U				M
Lucasite	A.J.32–375	A Vermiculite	7, 8	Sub 73, 78			2.6		
Ludlamite	Ap. 3–70	$Fe_7P_4O_{17}9H_2O$	75, 4	4, 1, 75	D Ct	3–4	3.12		IV
Mallardite	Ap. 3–72	$MnSO_4+7$ aq	23		U				IV
Manganosite	Ap. 3–73	MnO	37, 4	72	A	5–6	5.18		I
Manganostibiite	Sm. '84	5 MnO $(SbAs)_2O_5$	2		C				III
Marmairolite	Ap. 3–74	R Si O_3, R = Mg t a Mn Na	19, 5	1		5	3.07	D	IV?
Martinite	A.J.35, 418	$2Ca_3(PO_4)_2+4CaHPO_4+H_2O$					2.894		VI
Matricite	Ap. 3–74	$Mg_2SiO_4+H_2O$	7	1, 31	H	3–4	2.53	inf.	Cry
Melanocerite	A.J.35, 417	Complex Cerium Silicate	21, 8		Tr				VI
Melanosiderite	Ap. 3–75	$(Fe_2)_4SiO_{14}6H_2O$	2, 3	8–57, 3, 72		4.5	3.391	F	A
Melanotekite	Ap. 3–75	$SiO_2Fe_3O_4PbO$	2–2, 7	4, 7, 73, 70	Ct			F	M
Meroxene	Ap. 3–76	$Si_6Al_6K_3H_3O_{24}$ & $Si_6Mg_{12}O_{12}$	2	81	W	2.5–3	2.7–3	inf.	VI
Microcline	Ap. 3–80	$K_2(Al_2)Si_6O_{16}$	1, 4, 9	1, 72	W	6	2.54	5	V
Milarite	Ap. 1–10	Zeolite ?	23–4	72	F	5.5–6		E.	VI
Miriquidite	Ap. 2–40	PbO, Fe_2O_3, As_2O_3, P_2O_5, aq.	2, 8	44, 5, 72	F	4		E	VI
Mixite	Ap. 3–28	$Cu_{20}Bi_2As_{10}H_{44}O_{76}$	37–6, 4	69, 37, 64	U	3–4	2.66		
Monzonite	Ap. 1–11	Al_2O_317, FeO 9, CaO 10, SiO_2 53+	69, 7, 4	72	Sub Z	6	3	3	C
Mottramite	Ap. 3–83	$(PbCu)_3V_2O_8+2(PbCu)H_2O_2$.	20, 2	5, 70		3	5.89		Cry.
Muckite	Ap. 3–83	$C_{20}H_{28}O_2$	69, 8, 5			1–2	1.00 5	F	
Neociano	Ap. 3–84	Cu Silicate	6		Tr			F	IV
Newberryite	Ap. 3–84	$Mg_2H_2P_2O_8+6$ aq	19, 5		W				III
Neudorfite	Ap. 3–84	$C_{18}H_{28}O_2$	1–23	59	Z		1.05–1.06	F	
Niccochromite	Ap. 3–85	2 NiO, Cr_2O_3	5	75					Am.
Nitroglauberite	Ap. 2–41	$4NaOSO_3+6Na_2ON_2O_5+5H_2O$	23		U			F	
Nocerite	Ap. 3–85	Fe Ca Mg O +	1						VI
Nordenskiöldite	A.J.35, 417	Ca O Sn O_2 B_2O_3	24–5		Tr	5.5–6	4.2		I
Pennoite	Sm. '85	$MgB_2O_4+3H_2O$	5, 4, 7 or 3	74	= U	3–4	2.27		G, C
Phillipite	Ap. 3–92	$CuOSO_3+Fe_2S_3O_{12}$ +aq	33, 4	72	U				M
Phosphuranylite	Ap. 3–92	$(UO_2)_3P_2O_8+6H_2O$	26, 5	31	L				
Picroallumogene	Ap. 3–93	$2MgSO_4+(Al_2)S_3O_{12}+28$ aq	1, 53, 3	1				E	4or5
Picroepidote	Sm. '83	Mg Epidote	1–5			6		inf.	IV?
Pilinite	Ap. 3–93	$(CaLi_2)(Al_2)Si_5O_{15}+$ aq	1–23	79	D W		2.263	E	III
Pilolite	Ap. 3–94	$Mg_4(Al_2)Si_{10}O_{27}15H_2O$	1–19, 7		U				
Plagiocitrite	Ap. 3–94	$R_2SO_4+(R_2)SO_6+9$aq, R=Al Fe	26, 5					F	4or5
Polyarsenite	Sm. '85	$4MnOAs_2O_5+H_2O$	5, 3	82			4.085		G
Polydymite	Ap. 3–95	Ni_4Si_5	69, 7	75, 73	D J	4.5	4.81	F	I
Porepnyte	Ap. 3–96	$C_{22}H_{36}O_4$	22, 69, 4				.85–.95		
Protovermiculite	This Cat.	SiO_2 33, Al_2O_3 15, Fe_2O_3 6 MgO 2, H_2O 3	7, 4	Sub 73	L	2	2.269	4	Mica
Pseudobrookite	Ap. 3–97	TiO_2 53, Fe_2O_3 +	8–2, 3	5, 70, 78	H to sub Z	6	4.98		III
Pseudocotunnite	Ap. 3–97	$PbCl_2+KCl$	5						Cry.
Pseudonatrolite	Ap. 3–98	SiO_2 63, Al_2O_3 15, CaO 9, H_2O 15	23–1	72–31		5–6		3	III?
Psittacinite	Ap. 3–98	PbO 42, CuO 15, V_2O_5 15, aq +	4–34, 4					E	Cry.
Quenstedtite	A.J.36, 156	$2FeO_2H+8Fe_2(SO_4)_3+10$aq	3, 58		Tr				IV
Randite	Ap. 3–102	$Ca_5U_2C_6O_{20}+3H_2O$	5	77	Cry				Oci.
Reddingite	Ap. 3–102	$Mn_3P_2O_8+3$ aq	53, 9–5, 1	72–Sub 70	H	3–3.5	3.1	2	III
Reinite	Ap. 3–102	$FeWO_4$	2, 8	8 Sub. 73	H	4	6.640		II
Rinkite	Sm. '84	Ce Ca Ti O_2 SiO_2 Na F +	5, 8–46, 5	72–78		5	3.46		IV
Rogersite	Ap. 3–104	YO 60 CbO 5 18 H_2O 17 %	1	31	Cry	3.5	3.313		A
Roscoelite	Ap. 3–104	4 Al $VO_4+K_4Si^9O_{20}+$ aq	21, 8, 4	31–Sub. 73	D W	soft	2.93	E	M
Rosenbuschite	A.J.35, 417	Zr pectolite	56, 7			5–6	3.3		IV
Sarkinite	Sm. '85	See Polyarsenite	21, 3	78	W	4–5			?
Schneebergite	Ap. 3–107	Ca O Sb O_3 +	45, 5	72–71	N J Z	6.5	4.1	inf.	I
Schraufite	Ap. 3–107	$C_{11}H_{16}O_2$	32, 3		Semi Z	2–3	1–1.12		A
Semseyite	Ap. 3–108	S Sb Pb	7	73				F	Cry.
Serpierite	Ap. 3–109	Zn O CuO S O_3	4–6		Tr				III
Siderazot	Ap. 3–109	Fe_5N_2	12	73					A
Sideronatrite	Ap. 3–109	$Na_2SO_4+(Fe)_2O_3+6$ aq	5	19, 5–5, 1		2.5	2.153		Cry.
Siderophyllite	Ap. 3–80	$R_2(R_2)Si_3O_{12}$, R = Al Fe K +.	2, 4	75	F	3.2	3.1	2.5	IV
Silicate of Yttria	804	SiO_2 Yt O	8			5–6	4.391	inf.	
Sipylite	Ap. 3–110	$R_3M_2O_8$, M = Cb Eb +	8, 2–8, 56	8–7, 70	Ct Z H	6	4.89	inf.	II
Sperrylite	A.J.37, 67	$PtAs_2$	14, 1		Z	6–7	10.6		I
Sphaerocobaltite	Ap. 3–111	Co CO_3	20, 2–53, 3	42, 3	Rad	4	4.02–4.13		Cry.
Spodiosite	Ap. 3–112	$5Ca_3P_2O_8+4CaF_2$	47, 7–8	1, 72, 61	H	5	2 94	5	III
Strengite	Ap. 3–116	$(Fe_2)P_2O_8+4$ aq	42, 3–23	5, 1, 72	J Rad	3–4	2.87		III
Stuvenite	A.J.33, 80	$(Na_2Mg)SO_4+Al_2S_3O_{12}+24H_2O$							Aci.
Sulphohalite	A.J.36, 463	$3Na_2SO_4$, 2 Na Cl	69, 4, 5	1		3.5	2.49		I
Stützite	Ap. 3–117	Ag_4Te	11, 7, 3	2, 11, 7, 73	H to sub Z			E	IV
Synadelphite	Sm. '84	Mn Arsenate + aq	22–8	72–Sub 73		4.5	3.46–3.50		IV
Szaboite	Ap. 3–118	$Ca_2(Fe_2)_{11}Si_{35}O_{105}$	55, 8–7, 3	10, 3, 72	Tr	6–7	3.505	D	V
Szmikite	Ap. 3–118	$MnSO_4+H_2O$	1–53, 3		G	1.5	3.15		A.S
Thaumasite	Ap. 3–120	$CaSiO_3+CaCO_3+CaSO_4+14$aq	1	78, 66	Sub Z	3.5	1.877	inf.	M
Titanomorphite	Ap. 3–122	$CaTi_2O_5$	1		U			F	IV
Tocornalite	Ap. 2–56	AgI + HgI_2	19.5–4	5	G	soft		S	A
Triploidite	Ap. 3–125	$R_4P_2O_9H_2O$, R = Mn Fe	5–3, 8	1, 72, 78, 71	W Sub Z	4.5–5	3.697	2	IV

NEW SPECIES NAMES.	References.	Composition in percentage or Formulæ.	Color.	Streak and Lustre.	Cleavage and Fracture.	Hardness.	Specific Gravity.	Fusibility.	Crystallization.
Trippkeite	Ap. 3-125..	(n Cu O, As_2O_3)	6, 4	75	=	.....	.....	E	II
Cysonite	Ap. 3-126..	(Ce, La, Di)$_2$ Fl_6	19, 59-5	1, 72, 70	D Ct	4.5-5	6.12-6.14	inf.	VI?
Dintahite	Sm. '85....	Near Asphaltum	2	2, 74, 75	F Z	2-2.5	1.06-1.07	1	M
Uranocircite	Ap. 3-127..	$Ba U_2 P_2 O_{12} + 8 H_2 O$	5	.....	D W	.....	3.5	.....	III
Utahite	Sm. '84....	$3 Fe_2 O_3, 3 SO_3 + 4 H_2 O$	.....	79	.....	.....	.....	.....	VI
Valaite	805.....	C H O	51, 2	2, 74	H	1	.....	E	M
Vanuxemite	This Cat...	$Si O_2$ Zn O $Al_2 O_3$ H_2 O	1	66	= Z	2.5-3	2.5	E	
Vestan	806.....	$Si O_2$	.....	.....	.....	.....	2.65	.....	V
Vattevillite	Ap. 3-131..	R S O_4 + 2 aq. R = Ca K Na Mg...	60, 1	79	U	.....	1.81	D	3 or 4
Webskyite	A.J. 34, 72..	SiO_2 35, Al_2O_3 Fe_2O_3 10, aq 10, Mg O 22 +	2	7, 8	.....	.....	1.771		
Werthemanite	Ap. 3-131..	$Al_2 SO_6 + 3 H_2 O$	1	.....	.....	.....	2.8	inf.	M
Xanthoarsenite	Sm. '84.....	Mn Arsenate + aq	24, 5						
Zincaluminite	Ap. 3-133..	2 Zn SO_4 + 4 Zn H_2O_2 + 3 A P_2 H_8O_6 + 5 aq	1-6	.....	.....	2.5-3	2.26	.....	6 or 3
Zinnwaldite	Ap. 3-77...	$R_8 Si_3 O_{10}$ Li Fe Mica	4, 7-7, 1	31	D W	2.5-4	2.84-3	2-2.5	III
Zonochlorite	This Catal	ogue, see full description	Different shades of 4	19, 4	.....	6.5-7	3.113	D	M
Zunyite	Sm. '84.....	$Al_2 O, 3 Si O_2$ + aq	23, 2	72	.....	7	2.875	.....	I
229 Titanite	383.....	CaO + TiO_2SiO_2	8, 7, 5, 4, 2	1, 71	I	5-5,	4.4-3.56	.....	IV



Sulphohalite.

In the Am. Journal of Sciences and Arts for December, 1888, Messrs. Hidden and Mackintosh give an account of a new sodium sulpato-carbonate, from which we condense as follows: "It is transparent with a faint greenish-yellow color; specific gravity, 2.489; hardness, about 3.5; slowly soluble in water, and unaltered in moderately dry atmosphere. Analysis: Cl 13.12, SO_3 42.484, Na_2 CO_3 1.77. Calculating the Cl and S as combined with Sodium only, we get Na Cl 21.624, Na_2 SO_4 75.411, Na_2 CO_3 1.75.

Formula: Na_2 ($\frac{3}{4}$ SO_4, $\frac{1}{4}$ Cl_2), or 3 Na_2 SO_4, 2 Na Cl.

"Except the rare Connellite from Cornwall we know of no other species related in composition. We learn from Dr. A. E. Foote, in whose stock of Borax Lake minerals we found a single specimen of the mineral, that he had visited the locality the past summer, and that about one month before his arrival the company had been testing the immense alkaline deposit of Borax Lake (San Bernardo Co., Cal.), and had drilled an 8-inch hole to a depth of over 100 feet. At a depth of 35 feet a small cavity was discovered, from which were pumped out through the drill-hole the sulphohalite with some very remarkable crystals of Hanksite. But three specimens are known to us." (Three others have since been discovered.)

TABLE OF COLOR.

The numbers given in these columns are Dana's Species Numbers; see Table of Species.

The following are the abbreviations that indicate color:

1 White; 2 black; 3 red; 4 green; 5 yellow; 6 blue; 7 gray; 8 brown; 9 pink; 10 copper; 11 lead; 12 steel; 13 iron; 14 tin; 15 bronze; 16 brass; 17 purple; 18 pinchbeck; 19 pale; 20 velvet; 21 dark; 22 dirty; 24 sulphur; 25 aurora; 26 lemon; 27 cherry; 29 cochineal; 30 pomegranate; 31 pearl; 32 hyacinth; 33 azure; 34 olive; 35 leek; 36 verdigris; 37 emerald; 38 grass; 39 pistacio; 40 sky; 41 indigo; 42 peach; 43 apple; 44 ochre; 45 honey; 46 straw; 47 ash; 48 flesh; 49 lavender; 50 raven; 51 pitch; 52 wood; 53 rose; 54 sea; 55 hair 56 orange; 57 brick; 58 violet or purple; 59 wax; 60 snow; 61 liver, 62 oil; 63 clove; 64 milk; 65 asparagus; 66 dull; 67 tile; 68 silver; 69 colorless; 69 light; (—all colors). Letters indicate unnumbered Species, which may be found on page 37 of the Catalogue.

1	1	1	1	2	2	3	3	4	4	4	5	5	5	6	7	7	8	8
1 A	295 A	430	681	25	377 A	12	392	56	415	595 A	1	414	656	34	3	222	575	23	470
2	297	430 A	685	32	411	19	394	141	415 A	597	22	415 B	659 A	100	5	223	592	33 A	471
4	298	432	688	40	425	20	404	142	416	597 A	27	417	660	153 A	6	234	595 A	56	471 A
6	299	433	689	40 C	435	26	404 E	150	417	614	28	420	663	154	13	236	597	56 A	476 A
	300	434	693	52	436	49	406	153	420	615	49	420 B	671	160	14	237	597 A	57	479
8	301	446	695	56	437	51	411	153 A	420 D	615 A	54	420 C	672	179	15	238	599	67	484
9	302	451	697	58 A	438	57	413	173	422	622	56	420 G	678	183	16	249	632	68 A	486
10	303	459	711	59	439	64	414	174	422 A	622 B	57	421	681	194	19	244	635	70	490 A
11	304 A	470 A	715	60	440	71	417	183	423 A	634 A	75	423 A	682	203	29	246	638	76	490 B
14	305	490	716	70	443	72	418	185	423 B	636	77	424	683	214 A	29 A	253	640	81 A	490 D
17	309	490 D	717	76	452	85	420	203	424	641	78	425	684 A	218 D	30	253 A	641	162	493
18	310	490 F	718	89	456	100 A	420 A	210	426	644	79	428	684	238 B	31	257	650	146	494
19	310 A	490 G	719	99	456 A	115	420 E	222	428	659 A	90	429	685	254	32	258	654	173	496
20	310 B	492	720	100	458	117	422	225 A	429 A	662	116	430	687	273	33	262	716	183	497
21	310 C	493	723	108	458 A	118	427	234	430	664	121 A	430 A	690	287	34	263	717	190	499
24	311	500	724	111	458 B	127 A	425	235	436	668	133	431 A	691	299	38	270	718	192	508
35	312	501	726	117	468	132 B	448	236	441	669 A	139	442 B	692	300	40	272	719	193	510
36	313	502	727	120	469	138	450	239	442 B	675	141	445 A	693	305	40 C	272 E	720	194	515
37	314	503	728	122 B	473	144	459	238	443	694	142	445 C	695	306	42	275	721	195	516
48	314 A	503 B	729	127	474	144 A	461	240	444	696	143	446	696	307	43	280	722	195	552
50	316	504	730	130	475	146	470	242	445	701	144	447	708	320	44	285	723	198	553
56	319	515	733	131	476	148 A	471	243	445 C	702	145	447 A	710	324	45	293	726	203	554
73	320	516	735	132	477	149	490 A	245	447 A	704	146	461	711	325	46	294	727	204	558
82	321	517	736	134	478	161	492	246	448	705	148	470 A	712	326	47	295 A	728	205	560
83	322	518	737	153	478 A	162	493	254	448 A	706	144 A	472	718	335	44 A	298	730	207	569
83 A	322 A	520	738	164	479	169	496	259	449	709	150	477	719	346	44 B	299	736	208	570
84	323	520 B	739	178	480	172	499	261 A	449 A	718	152	484	720	346 A	53	300	737	209	572 A
85	324	520 C	740	180	481	176	500	264	450	723	161	490 C	723	348	55	304 A	738	213	576
86	325	522	741	180 A	482	193	503 A	266	452	728	162	490 D	724	351	58	305	741	218 A	589
88	326	523	742	181	449	194	507	273	453	741	169 A	490 E	728	353 A	59	308	742	232	581
90	327	528	744	182	483	197	526	276	454	747	176	491	730	354	62	309	743	234	582
91	328	549	745	183	484	198	526 A	276 A	454 A	750	177	492	731	372	62 A	310	745	235	584
92 A	331	550 A	746	184	485	202	531	279	455	751	182	494	732	374	64 A	311	749	240	586
93	333	554	748	185	486	204	532	280 A	457	751 B	183	495	732 A	393	65	312	772	241	606
93 A	333 A	556	749	186	490 B	207	549	282	458	754	193	496	735	417	65 A	314 A	781 C	246	611
94	370	564	753	187	499	208	556	288 A	458 A	755	198	497	741	418 A	66 A	315	798	255	613
95	370 A	566	772	188	526 C	209	558	289	460	755 A	201 A	501	745	453	73	316	802	262	614
96	371	571	779	188 A	536	212	561	290	462	772	212	504	749	462	74	321	818	263	616
100 A	372	574	780	189	539	216	562	293	463	773	215	505	753	465	80	322	820 A	265	620
102	374	590	784	190	560	218 A	574 A	295	464	830 C	216	506	755 A	470	81	324	Cl	266	621
136	375	591	785	192	582	226	575	299	465	An	222	507 A	758	470 A	81 A	377 A	Cr	267	623
137	376	592	786	193	585	228	576	300	466	Ba	224	509	772	492	84	382	Mo	269	623 A
138	376 A	593	794	194	606	231	577	302	467	Ki	225	510	773	498	86	383	Se	272	624
139	377	594	795	195	610	232	580	304	469	Ma	225 A	515	778	499	87	384	Hydr	272 A	634 A
145	378	595	796	196	612	236	581	205	490 C	Mi	227	516	779	523 A	88	395		272 B	634 B
146 A	379	595 A	797	198	618	241	611	307	492	Mo	228	518	783	526 B	92	401		272 C	632 A
147	381	596	805	199	620	240	614	311	498	Zo	231	519	786	526 C	93 A	402		272 D	682
150	382	597	806	200	623	255	616	312	502	Diab	232	531	793	542	95	404		272 E	696
151	383	598	821	201	646	232	617	315	503	Psit	234	532	798	547	97	404 A		272 F	718
160	384	599	822	202	696	232 A	617 A	316	504	Rose	237	535	799	551	98	405		273	716
163	385	600 A	824	204	701	263	619	319	507	Euch	254	537	799 A	552	99	406		274	719
163 A	386	601	832	217	675	266	623 A	320	508		259 A	550 A	799 B	554	101	407		276	721
164	387	601 A	Da	218	751 A	269	624	323	525		265	554	800	554 C	103	411		278	722
165	388	602	Ge	218 A	816	270	632	324	527		266	556	801	563	104	412 A		283	731
166	389	603	Frie	218 B	826	272	642	325	529		267	557	802	574 B	105	414 A		285	732
167	390	604	Vanu	218 D	827	272 A	643	326	533		268	558	807	595 A	106	417		277	751 A
168	391	614		218 E	830	272 B	656	327	536		271	559	813	630	107	418		293	778
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170	393	626		235	830 B	272 D	660	335 A	539		274	569	828	634 A	110	420		311	781 A
179	393 A	627		239	830 C	281	667	345	540		275	570	837	636	111	420 F		319	781 B
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211	397	631		253	Op	295	721	348	544		288	573 B	Py	668	113 A	423		331	799
212	400	632		253 A	Py	295 A	722	349	545		292	580	To	669	114	426		338	803
214	400 A	633		259 A	Va	296	723	357	546		304	581	Ihle	669 A	119	429		360	807
219	401	635		260	Wa	300	724	361	547		305	584	Hydr	670	121	433		359	807 A
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229	404 D	652 A		279		316	814	376	554		326	597 A		743	128	459		385	819
232	404 E	653		282		319	817	376 B	554 B		327	605		750	129	459 B		404 A	825
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234	406 A	656 A		290		323	Hy	387	557		360	617		704	132 B	490 D		422	830 C
237	411	657		291		323 A	Py	401	558		361	621		An	134	498		424	830 D
237 A	413	658		295		327	Frie	404 C	573		373	622		Chal	135	500		427	Hy
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257	420 D	666		320		370		407	567		383	624			173	520		440	Achr
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280 A	422	674		334		386		411	573 C		395	638			203	550 A		447 B	
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9	10	11	11	12	12	13	14	15	16	18	19	19	21	21	22	23	23	23	24
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320	132 B	44	123	31	205	60	37	79			288	To	141	543		168	361	824	683
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		65	135	80		132	102				552		290	622 B		256	393 A		
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		93 A		87		188					561		409	625		272	562		
		191		97		189					562		437	631		295 A	635 A		
		103		98		199					574 B		444	636		297	652		
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		109		114		485					693		454	798		305 A	673		

25	26	27	29	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
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573	143	277	172	235	642	346 A	288 A	376 B	541	153	508	276	542	525	668	347	349	152	692
573 B	622	367		420 F	643	551	346 B	428	545	245	539	408	563			383	634	328	
	710				787		348	436	546	326	544	450	689			400	637	375 D	
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							409	444	583	416	555	615				435		505	
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							454	490	751 B	463	751					529		634	
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							535	553		541						572 A			
							536	568		545						583			
							555	572		448						734			
							562	615		544						Ba			
							615			572						Ma			
							620			701									
							622			705									
							644			747									
										751									
										755									

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					427		503 A								690 A	803		92 A	
					523 A		531								Ge			93	
		456			637		659											94	
		456 A			722		837											401 A	
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MAZAPILITE: A NEW SPECIES.

"Proceedings of the Academy of Natural Sciences, Philadelphia, July 3, 1888.

Prof. George A. Koenig announced the occurrence of this mineral in Zacatecas, Mexico, in the district of Mazapil. The crystals are well developed in all directions. They are of orthorhombic symmetry, exhibiting a flat prism in combination with a brachydome and a pyramid. The color is deep brown red, nearly black, but transparent at the edges. The hardness is nearly 7, its streak greenish yellow. The specific gravity, 3.567. In closed tube a white crystalline sublimate is produced ($AS^2 O^3$) and water, while the powder turns dark brown. B.B. fuses at 3 to a black globule. On charcoal the odor of arsenic is observed. With borax, only iron reaction. Easily soluble in warm HCL A preliminary analysis proves the mineral to be a *calcium ferric arsenite.* The structural formula must be made the subject of a more thorough investigation, which the speaker proposes to carry out this fall. This mineral is the first representative of the class of pure arsenites in nature, and is therefore of marked interest. For the material the author is indebted to the indefatigable zeal of Dr. A. E. Foote, who is now in Mexico." (Obtained by me from the well-known Mining Engineer, Sr. Francisco Zarate, A. E. F.)

A few small crystals of the above, 25c. to $1.00 each.

SCALE OL HARDNESS.—1 Talc; 2 Gypsum; 3 Calcite; 4 Fluorite; 5 Apatite; 6 Feldspar; 7 Quartz; 8 Topaz; 9 Corundum; 10 Diamond. Price of 9 Specimens in box cents; with file, magnet and porcelain plate for testing streak $1.00. The numbers are those given in the "Table of Speci s."

H. < I.	1-1.5	1.5-2	2-2.5	2.5-3	3-3.5	3.5-4	4-4.5	4.5-5	5-5.5	5.5-6	6-6.5	6.5-7	7-10
.....409...	..... 34...	..... 31...	..... 1...	..... 12...	..... 17...	..... 17...	..... 3...	..... 13...	..... 83...	..... 94...	..... 75...	.....231...	..... 49..
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.....	.....	.....520 C	.....416 A	..... 617...	..... 437...	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....572 A	.....656 A	..... 645...	.....463...	.....	.....	.....	.....	.....	.....	.....	.....

The *Dufrenite* from Rockbridge Co. Va., is the finest ever seen, some of the fibres being three inches long. Specimens 5c. to $2.00. *Stringite*, originally called *Bementite*, in fine amethystine crystals, is rarely associated with the Dufrenite. Specimens 25c. to $3.00. *Coeruleolactite*, from Penna., is a fine "heavenly skim-milk blue." Specimens from 5c. to $1.50. Of *Japanese Stibnite* we have had the finest specimens ever seen, one being exhibited at New Orleans by the Japanese Government. Some still in stock. $1.00 to $35.00. *Protovermiculite*, from Magnet Cove, Arkansas, described by Prof. G. A. Konig, is, as its name indicates, the finest and most strongly exfoliating of the Vermiculite family. Specimens 5c. to 50c.

NAMES OF SYSTEMS.—I. Isometric; II. Tetragonal; III. Orthorhombic; IV. Monoclinic; V. Triclinic; VI. Hexagonal; A. Amorphous; F. Fibrous; S. Stalactitic; M. Massive; C. Compact; Cry. Crystalline. Where a species occurs under several heads, we give it only under the most important as a rule.

CRYSTALLOGRAPHIC SERIES (Illustrating the six systems).—25 specimens, in box, $1.00; larger, $2.50 to $5.00; 50 specimens, in box, $5.00; or larger, $10.00 to $25.00.

I.	I.	II.	III.	III.	III.	IV.	IV.	V.	VI.	VI.	A.	M.	M.
1	137	16	22	294	634 A	26	640	241	6	715	64 A	23	449
2	138	78	27	295	635	34	641	242	7	716	36	37	458 B
3	138 A	99	28	319	635 A	98	642	285	14	717	73	38	460
4	139	136	29	322	636	108	644	286	17	718	209	39	463
5	140	150	30	325	643 ?	109	653	310	18	719	216	42	466
8	141	163 B	35	333	645	114	654	310 A	19	720	218 A	43	476
9	142	166	58	335 ?	650	115	656 A	311	20	721	247 D	46	478 A
10	149	167	59	341	652	116	658	312	21	722	279	47	490 A
12	154	192	60	349	655	128	659 A	314	25	723	349 A	50	501
13	159	193	61	361	656 ?	168	664	315	31	731	342	51	508
15	162 ?	194	62	362	661	169	667	324	32		374	53	515
24	163 A	195	63	363	662	171	670	381	33		375	65	526 C
40	172	196	83 A	372	663	200	671	503	64		404	67	538
40 C	173	272	90	373	666	226	678 ?	520 C	66		404 E	68 A	539
41	174	272 C	91	376 B	695	237	680 ?	541 A	68		409	72 A	549
44	178	272 F	92	377	701	238 A	682	594	69		413	79	550
45	180 A	273	92 A	378	702	239	687	660	70		416	80	561
48	181 A	274	93	384	724	248	700		71		422	81 A	563
49	182	296	93 A	388	726	240	705		72		425	98 A	567
52	183	297	94	389	727	243	730		100		435	103	571
54	184	298	95	390	728	244	736		117		437	122	574
55	185	299	96	392	729	245	738		118		439	122 B	576
56	186	300	97	393	732 A	247	739	Cry.	133		440	132 B	581
56 A	187	301	101	393 A	737	247 C	740		143		442	144	592
75	188	302	102	397	745	248	751		152		462	146	597 A
76	188 A	303	105	399		276	752		161		470 A	147	612
77	189	321	106	401		276 A	756	263	175		507 A	148	619
81	190	328	107	404 D		277	772	338	176		509	153 A	659
82	219	370	112	418		278		427	179		526 B	160	662 A
83	220	371	113	429		281		453	180		534	165	677
84	256	470	119	419		313		651	181		545	201 A	679
85	269	475	120	445		316		750 A	210		586	213	688
86	270	483	121	447 ?		323			212		587	217	690
87	271	484	122 A	459		326			214		615 A	222	692
88	305	490	124	461		327			215		618	223	693
89	306	505	129	473		330			231		684 A	228	696
110	307	506	130	474		331			231 A		694	229	707
111	308	572	131	477		336 A			254		710	238 B	712
125	309	572 A	132	478		337			255		732	250	741
127	309 A	614	132 A	479		339			256		753	252	742
134	336	616	135	480		343			267			260	749
	365	617	145	481		343 A			268			275	751 A
	366	617 A	148 A	482		348			289			279 B	751 B
	383	660	151	485		379			290 ?			280 A	
	385	733	153	498		394			290 A			295 A	
	471		163	499		395			304			310 B	
	472		164	500		445 D			304 A			310 C	
	558		177	502		450			320			314 A	
	597		191	504		457			344			323 A	
	598		198	510		458			345			332	
	646		199	516		486			369			334	
	673	S.	203	517		495			370 A			338 A	
	674		204	526 A		496			382			340	
	675		205	535		497			386			341 A	
	676	206	221	536		499 A?			387			342	
		218 D	221 A	537		503 A			445 A			346 A	
		421	224	540		518			445 C			347	
		490 C	227	543		519			448			350	
		589	231 B	546		520			451			364	F.
		715	234	553		520 B			452 ?			377 A	
	C.	747	235	554		521			456			380	
			236	560		522			456 A			405	
			246	564		523 A			492			406	247
	202		251	565		524			493			408	249
	402		257	568		525			494			412 A	323
	403		258	573		526			548			414	357
	465		259	573 C		527			582			414 A	358
	550 A		259 A	583		529			584			415	360
	555		261 A	590		530			591			415 A	381
	559		262	610		531			621			415 B	407
	574 A		264	611		541			622			417	411
	574 B		265	613		542			637			420 D	441
	600 A		280	620		547			638			420 H	459
	606		282	624		551			639			423 A	570
	626		283 ?	627		557 ?			647			423 B	595
	758		284	629		573 A			672			429 A	596
			287	630		573 B			683			431	602
			288	631		585			684			443	628
			288 A	632		599			688 A			446	681
			292	633		606			689			448 A	685
			293	634		634 B			691				

Specific Gravity ranges from Water 1 to Iridosmine 19–21. 25 Specimens, illustrating Specific Gravity, in box $1.00.
50 Specimens, mostly crystalized, in box $5.00.

<-2	2–2.5	5–3	2.5–3	3–3.50	3–3.50	3.50–4	4–4.5	4.5–5	5.–5.5	5.5–6.5	6.5–7.5	7.5–21
25	669	526	447 B	298	292	298	132	29	125	17	83	13
22	683	524	344	553	242	284	104	125	49	119	71	1
139	591	407	283	530	240	259 A	78	81	186	101	93	3
650	738	294	252	290	573 B	217	80	68	180	61	40	37
409	138	656	295	164	270	206	298	75	188	66	610	39
653	654	40	253	159	468	701	269	90	220	479	190	2
831	378	632	310	492	Ap. 1–11	751	205	186	118	474	494	12
830	379	168	305 A	503 B	247	752	217	196	226	483	493	8
664	343	304 A	373	294	555	721	202	199	105	221	617	64
672	305	597	286	459	560	499	189	217	106	117	572	99
409	383	492	601	243	160	498	182	180	107	140	192	31
661	386	327	434	320	321	259 A	536	181	108	644	84	44
674	392	304	411	280	258	269	153	34	55	172	97	475
137	394	237	432	461	326	241	543	226	51	178	93 A	572
599	447	339	264	230	267	631	284	586	200	551	92	38
602	413	370	214 A	323	265	503 A	260	100	145	196	65	47
516	390	363	313	322	277	262	726	224	133	113	458 B	45
688	316	299	689	718	228	324	723	630	141	131	45	41
374	554	311	549	26	284	179	266	367	700	85	43	40
736	212	244	575	27	218 D	191	547	185	539	94	99	48
594	210	316	647	701	345	749	538	120	228	18	72	58
402	740	315	422	568	356	361	544	101	496	129	60	98
650	346	314	743	248	257	728	56	121	366	130	124	32
668	414	314 A	568	329	269	722	204	79	480	30	103	616
685	309	247	346 A	285	28	721	193	82	126	190	136	20
425	232	689	340	276	57	56	198	66 A	127 A	642	510	64
590	548	419	448	269	169	206	272	54	178 A	729	641	218
737	581	418	357	273	218 A	458	110	145	478 A	633	151	5
627	687	401	433	238	238 A	194	127	188 A	272 F	614	150	58 A
739	682	293	449	361	238 B	198	52	187	472	95	621	35
663	692	715	451	203	245	333	77	332	485	86	613	10
673	580	724	208	325	246 A	225	63	69	573 A	88	611	201
671	425	716	56 A	719	454 A	183	545	481	645	112	753	7
666	359	717	169 A	218	573 C	221 A	541	161		111	229	9
596	660	747	171	492	526 C	219	263	732 A		478	83 A	1 A?
694	659 A	411	233	461	572 A	567	261 A	479		143	89	4
371	518	459	163 B	319	Ap. 2–63	752 A	537	490		142	223	15
421	307 A	288	237 A	289	268	535	556	29 A		141	72 A	64 A
376	381	429	448 A	293	335	570	227	121 A		619	635 A	72 A
408	377	400	370 A	234	362	289 A	731	132 B		643	577	177
23	389	450	Ap. 2–13	246	435	499	282	135		644	475	Tammite
175	372	452	429 A	546	443	334	471	180 A		644 A	577	
805 A	307	448	442 B	691	460	331	16	181 A		620	635 A	
830 F	306	231	600 A	684	502	730	81 A	225 A		92 A		
688 A	308	287	377 A	530	521	56	222	472		21		
405	341	254	656 A	369	526 B	Ap. 1–16	68 A	506		128		
515	495	218 E	Ap. 2–63	439	528	24	496 A	508		123		
662	391	542	652 A	249	531	76	595 A	509		624		
663	396	596	401 A	490 C	554	173	281			613		
667	447	524	415	165	559	284 A	365			336		
772	695	291	418 A	167	561	507 A	634			114		
778	564	449	420 E	595	574 A	587	Agnesite			89		
779	565	629	423 B	495	598	541 A	Bism			62		
780	550 A	655	424	495 A	697	276 A				733		
781	Ap 1–13	520	427	503	705	330				635		
781 A	554 C	166	431	573	Andr	365				638		
781 B	420	520 A	437	271	Hypo	470				73		
781 C	375	371	454	250	Vall	484				96		
782	163 A	370	456 A	235	Zono	598				122 A		
783	418	307 B	463	76		Pyro				152		
787	404	255	500	540						174		
793	465	297	504	153 A						624 A		
794	322 A	274	529	702						486		
798	741	310 B	550	572						619		
799	214	446	554 B	622						636		
799 A	462	445	554 C	558								
800	231 A. B	445 A	562	569								
	520 C	440	575	456								

Cacoclasite (discovered by A. E. F. in 1880) was described by Prof. H. C. Lewis. We have good square prisms at from 15c. to $2.00, some associated with blue calcite.

Astrophyllite, that interesting micaceous-looking mineral from Colorado, whose properties Dr. Kœnig has so fully investigated, in good specimens at from 5c. to $1.50.

Among my specialties, not mentioned elsewhere, are the White Garnets from Canada; the red, from Alaska, Bergen Hill, and Franklin Minerals, etc., etc.

Feldspar Group.

I. Relation of the Species of Feldspar.

The species of the Feldspar Group are related—

A. In crystallization: (1) the forms being all oblique; (2) the angle of the fundamental rhombic prism *I*, in each, nearly 120°; (3) the other angles differing but little, although part of the species are monoclinic and part triclinic; and (4) there being two directions of easy cleavage, one, the most perfect, parallel to the basal plane *O*, and the other parallel to the shorter diagonal section, with the intervening angle either 90° (as in the monoclinic species orthoclase and hyalophane), or nearly 90° (as in the triclinic species).

B. In composition: (1) the only element in the sesquioxide state being aluminum, and those in the protoxide state either calcium, barium, sodium, or potassium, or two or three of these bases together; (2) the ratio of 1 atom of R to 1 of R being constant; (3) the amount of silica in the species increasing with the proportion of alkali, being that of a unisilicate in the pure lime-feldspar, anorthite, that of a tersilicate in the soda-feldspar, albite, or potash-feldspar, orthoclase, and so directly proportioned to the alkali, that the amount in any lime-and-soda feldspar may be deduced by taking the lime (or calcium) as existing in the state of a unisilicate, and the soda in that of a tersilicate, and adding the two together.

Anorthite has the formula $CaAl_2O_8Si_2$.

Albite " " $Na_2Al\ O_{16}Si_6$.

The constitution of a species containing Ca and Na_2 in the ratio of 1 to 1 for the protoxide portion may be obtained as follows: Adding together the anorthite and albite formulas, we have $CaNa_2Al_2\ O_4Si_8$; then dividing by 2, the formulas becomes $\frac{1}{2}Ca\frac{1}{2}Na_2Al\ O_{12}Si_4$, which expresses the composition of andesite. With 3 parts of the Ca unisilicate, and 1 of the Na_2 tersilicate, the composition is that of labradorite. So it is for other combinations, that is for other species between anorthite and albite in composition.

The quantivalent ratio for the R, Al, Si, in the several species of the group, is as follows: $\bar{V}$ means *triclinic* in crystalfization, and IV *monoclinic*.

	Ratio.	System of Crystallization.		Ratio.	System of Crystallization.
Anorthite,	1:3:4	$\bar{V}$,	Oligoclase,	1:3:9	$\bar{V}$.
Labradorite,	1:3:6	$\bar{V}$,	Albite,	1:3:12	$\bar{V}$.
Hyalophane,	1:3:8	IV,	Microcline,	1:3:12	$\bar{V}$.
Andesite,	1:3:8	$\bar{V}$,	Orthoclase,	1:3:12	IV.

These are the *normal* ratios; but there is some variation from them in the analyses, part of which is variation in actual composition, and part a result of interlamination or mixture of two feldspars together. Thus, orthoclase occurs mixed with microcline, albite, or oligoclase. But while such mixtures account for the soda found in some analyses of orthoclase, it does not for that in all, since soda does occur in many specimens of pure orthoclase, replacing part of the potash. It is the same with the triclinic feldspar microline, which has the composition of orthoclase, and may have the alkali portion all potash or part soda, one analysis of typical microline giving only 0·48 of soda. It is, hence, not safe to calculate the percentage of orthoclase present in a feldspar from the percentage of potash. Moreover, potash is present in much albite.

The above ratios show that anorthite has for the ratio between R+R and Si, 4:4, or 1:1, as in true unisilicates; while in albite and orthoclase, the same ratio is 4:12 or 1:3, that of a tersilicate, as above stated.

C. Physical characters: the hardness being between 6 and 7; the specific gravity, between 2·44 and 2·75; lustre vitreous, but often pearly on the face of perfect cleavage; and each species transparent to subtranslucent.

II. Acidic and Basic Feldspars.

Oligoclase, albite, and orthoclase are call *acidic* feldspars, because of the large amount of the acidic element, silicon, in their constitution, analyses giving 60 to 70 per cent. of silica; and labradorite and anorthite are called basic feldspars, the amount of silica being 42 to 55 per cent. Correspondingly, eruptive, and metamorphic rocks in which either of the acidic feldspars is a prominent constituent—for example, granite, gneiss, trachyte, true porphyry—are called acidic rocks; while those rocks in which basic feldspars are constituents—like doleryte, and a large part of eruptive rocks—are called basic rocks.

III. Distinctions of the Triclinic Feldspars.

The triclinic feldspars are distinguished from the monoclinic (*e. g.* orthoclase) by the occurrence of very fine striations on the cleavage surface, sometimes too fine to be seen without a good pocket-lens. These striations are due to multiple twinning parallel to the other cleavage face. They are rarely absent from triclinic feldspar crystals. There are best brought out by transmitted polarized light, in which a transverse section of the crystal is seen banded with spectrum colors, each band corresponding to one plate of the twin structure.

The triclinic feldspars, andesite excepted, may be distinguished from one another by an optical method when the cleavage direction can be made out. For this purpose a plate is prepared parallel to the plane of easiest cleavage. In such a plate the multiple twinning is parallel to the other cleavage plane, or the shorter diagonal. When the plate is placed on the stage of a polariscope, between crossed Nicolprisms, as the stage is revolved, the adjoining bands of color become dark alternately, and the angle through which the plate has to be revolved for the change between consecutive bands varies for different species, it being 54° to 74° for anorthite, 10° to 14° for labradorite, 4° to 8° for oligoclase, $6\frac{1}{2}$° to 8° for albite, and 30° for microcline. The shorter diagonal of the crystal bisects this angle, so that the angle made with this diagonal is 27° to 37° for anorthite, 5° to 7° for labradorite, 2° to 4° for oligoclase, $3\frac{1}{2}$° to 4° for albite, and 15° for microcline. Obtaining cleavage plates for such measurements in the case of slices for microscope investigation, is seldom possible, and when not so, the only certain resourse for the distinguishing of triclinic feldspars is chemical analysis. These feldspars have been called *plagioclase* (from the Greek words for *oblique* and *fracture*), as if all were of one species. The term is a convenient cover for ignorance.

IV. Distinctions from other Minerals.

When in crystals, the form is sufficient to determine a feldspar, so also the fact of two unequal cleavages inclined to one another at 84° to 90°, one of them quite perfect. No fibrous, columnar, or micaceous varieties are known. They differ from rhodonite, by the absence of a manganese reaction; from spodumene, by the absence of a lithia reaction as well as cleavage angles; from scapolite, by form, the cleavage angles, the more difficult fusibility; from nephelite, by form, and also in difficult fusibility, and not gelatinizing with acids, except in the case of anorthite and labradorite, which fuse with but little more difficulty than nephelite, and often will gelatinize.

Anorthite.—Indianite. Lime Feldspar.

Triclinic. Angle between the two cleavage planes 85° 50′ and 94° 10′. Crystals tabular. Also massive granular or coarse lamellar. Color white, grayish, or reddish.

Composition. $CaAl\ O_8\ Si_2$=Silica 43·1, alumina 36·8, lime 20·1=100. B. B. fuses with much difficulty to a colorless glass; decomposed by hydrochloric acid, the solution gelatinizes on evaporation.

Obs. Occurs in basic eruptive rocks; also in some metamorphic rocks. Found in the lava of Vesuvius; in the Tyrol; Faroe Islands, Iceland; in imbedded crystals in some doleryte of the Connecticut Valley.

At Hanover, N. H., anorthite crystals occur altered to a silicate which afforded, in an analysis by Hawes, only 2·2 of lime, and, in place of the rest of this ingredient, 7·11 of potash, 3·77 of soda, 1·10 of iron-sesquioxide, and 2·67 of water, with 30·05 of alumina and 52·52 of silica; which compound, if the water be made basic, has the ratio nearly of labradorite, though distinct from that species in the alkalies, and also in specific gravity, which is 2·96 or very nearly 3. It has some relation to zoisite, and to typical saussurite, but is widely different in constituents and ratio; it is related also to jadeite.

Labradorite.—Lime-soda Feldspar. Labrador Feldspar.

Triclinic. Angle between the cleavage planes 93° 20′ and 86° 40′. Usually in cleavable massive forms.

Color dark gray, brown, or greenish brown; also white or colorless. Often a series of bright chatoyant colors from internal reflections, especially blue and green, with more or less of yellow, red, and pearl-gray.

Composition. $\frac{3}{4}Ca\frac{1}{4}Na_2Al\ O_{10}\ Si_3$=Silica 52·9, alumina 30·3, lime 12·3, soda 4·5=100. Sometimes contains a little potash in the place of the soda. B. B. fuses quite easily to a colorless glass. Only partially decomposed by hydrochloric acid.

Obs. A constituent of the larger part of eruptive rocks, as doleryte, and amphigenyte, and many lavas; and also of some metamorphic rocks. Occurs as an ingredient in part of the Archæan rocks in North America, and was named from its first discovery in Labrador. (5c. to $3.00 per specimen. A. E. F.)

Andesite. Triclinic. Angle betweeu the cleavage planes 87°–88°. Near labradorite in composition. The formula $\frac{1}{2}Ca\frac{1}{2}Na_2AlO_{12}Si_4$= Silica 59·8, alumina 25·5, lime 7·0, soda 7·7=100·0.

Hyalophane. Monoclinic, and hence angle between the cleavage planes 90°. A baryta feldspar; the formula like that of andesite, excepting the substitution of Ba for Ca and K_2 for Na_2. It has been found in the Binnenthal, Switzerland, and at Jakobsberg, Sweden.

A baryta-feldspar, having the ratio of andesite, 1 : 3 : 8, has been described which is *triclinic*, and approaches oligoclase in optical characters.

OLIGOCLASE.—SODA-LIME FELDSPAR.

Triclinic. Angle between the cleavage planes 93° 50′ and 86° 10′. Commonly in cleavable masses. Also massive.

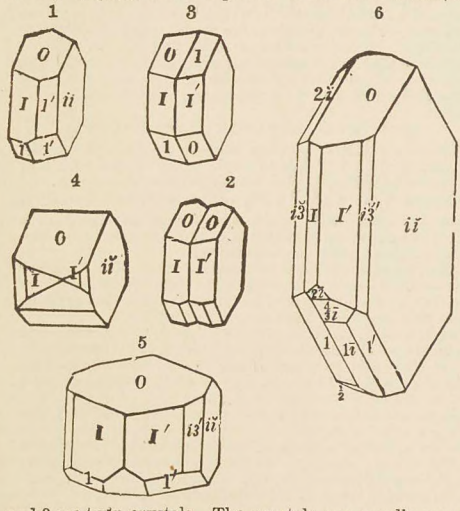
Color usually white, grayish white, grayish green, greenish, reddish. Transparent, subtranslucent. H.=6·7. G.=2·5–2·7.

Composition. $\frac{1}{4}Ca\frac{3}{4}Na_2Al\ O_{14}\ Si_5$=Silica 61·9, alumina 24·1, lime 5·2, soda 8·8=100. A portion of the soda is usually replaced by potash. B.B. fuses without difficulty; not decomposed by acids.

Obs. It occurs in granite, syenyte, and various metamorphic rocks, especially those containing much silica; and in such case usually associated with orthoclase. *Sunstone* is in part oligoclase containing disseminated scales of hematite giving bright reflection from the interior of the stone. Occurs in Norway. *Moonstone* is in part a whitish opalescent variety. Oligoclase occurs at Unionville, Pa.; Haddam, Conn.; Mineral Hill, Del.; Chester, Mass., etc. (5c. to 1.50 each)

ALBITE.

Triclinic. Angle between the cleavage planes 93° 36′, 86° 24′. Figures 1 to 6 represent some of its forms; 2



and 3 are twin crystals. The crystals are usually more or less thick and tabular. Also massive, with a granular or lamellar structure. Color white; occasionally light tints of bluish white, grayish, reddish and greenish. Transparent to subtranslucent.

Composition. $Na_2\ Al\ O_{16}\ Si_6$=Silica 68·6, alumina 19·6, soda 11·8=100·0. B. B. fuses to a colorless or white glass, imparting an intense yellow to the flame. Not acted upon by acids.

Cleavelandite is a lamellar variety occuring in wedge-shaped masses at the Chesterfield albite vein Mass.

Obs. Albite occurs in some granites and gneiss, and is most abundant in granite veins. Fine crystals occur at Pike's Peak, Middletown and Haddam, Conn., at Goshen, Mass., and Granville, N. Y.; Unionville, Delaware Co., Pa.

The name albite is from the Latin *albus*, white. (5c. to 5.00 each. A. E. F.)

MICROCLINE.

A triclinic potash feldspar. The name microcline was originally given by Breithaupt to a whitish or reddish feldspar from the zircon-syenite of Fredericksvärn and Brevig, Norway, on the ground that it was triclinic. It was shown by Descloizeaux that this feldspar was merely a variety of orthoclase, remarkable for its large amount of soda. Recently the latter author has proposed to retain this name for a feldspar found in the midst of granites, pegmatite and gneiss, which is shown both by the angle between its cleavage plans, and also by its optical properties, to be really triclinic. Form generally like that of orthoclase. Cleavage basal and clinodiagonal, and also easy parallel to both prismatic faces (I and I′). Often associated with orthoclase in regular parallel bands, especially in the amazonstone; albite is also sometimes present, though irregularly. Analysis of a "pure microcline" from Magnet Cove, by Pisani (to whom I furnished the specimens. A. E. F.) G.=2·54.

SiO_2 Al_2O_3 Fe_2O_3 K_2O Na_2O ign.

64·30 19·70 0·74 15·60 0·48 0·35=101·17

It is very close to orthoclase in angles, and also in physical characters, and identical with it in composition. But it is very slightly triclinic, the angle between its cleavage planes varying from 16′ from 90°; and hence its cleavage surface shows usually the fine striations exhibited, with rare exceptions, by all the triclinic feldspars. Colors white, flesh-red, copper-green. The last is what has been called amazonstone; as heat destroys its color it has been supposed to be of organic origin. (Organic salt of iron, König.) (5c. to $50.00 for crystals.)

The association of orthoclase and microline was observed in specimens from the Ilmen Mts.; Urals; Arendal; Greenland; Labrador; Everett, Mass.; Delaware, Chester Co., Penn.; Pike's Peak, Col.; Redding, Ct., etc. "The purest microcline was that of a greenish color from Magnet Cove, Ark.; it enclosed crystals of ægirite, and was not mixed with orthoclase. Des Cloizeaux." The microcline from Magnet Cove, which Des Cloizeaux calls the purest, I can furnish at from 25c. to 5.00, according to size and color. That from Redding, Ct., 5c. to 1.00.

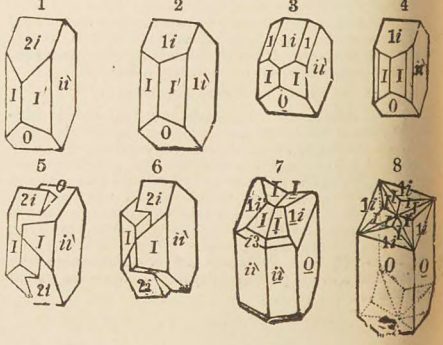
ORTHOCLASE.—COMMON FELDSPAR.

Monoclinic; and hence angle between the cleavage planes 90°. Figures 1 to 4 represent common forms, and 5 to 8 twin crystals. Usually in thick prisms, often rectangular, and also in modified tables. Also massive, with a granular structure, or coarse lamellar; also fine-grained almost flint-like in compactness. Colors light; white, gray and flesh-red common; also greenish and bluish-white and green.

Composition. $K_2Al\ O_{16}\ Si_6$= Silica 64·7, alumina 18·4, potash 16·9=100. Soda sometimes replaces a portion of the potash. B.B. fuses with difficulty; not acted on by acids.

Common feldspar includes the common subtranslucent varieties; *Adularia*, the white or colorless subtransparent specimens, a name derived from Adula, one of the highest peaks of St. Gothard. *Sanidin* or *glassy feldspar* includes transparent vitreous crystals, found in trachytes and lavas; but some of the "glassy feldspar" belongs to the species anorthite. *Loxoclase* is a grayish variety with a pearly or greasy lustre that contains much soda.

(I am indebted to John Wiley & Son, for these cuts of crystals.)



MOONSTONE is an opalescent variety of adularia, having, when polished, peculiar pearly reflections. *Sunstone* is similar, but contains minute scales of mica. Aventurine feldspar often owes its iridescence to minute crystals of specular or titanic iron, or limonite. Sunstone and Moonstone are mostly oligoclase, and so is a large part of aventurine feldspar.

DIFF.—Distinguished from the other feldspar by the right angled cleavage, and the absence of striated surfaces.

OBS.—Orthoclase is one of the constituents of granite, syenyte, gneiss, and other related rocks, also of Porphyry and Trachyte, and it often occurs in these rocks in imbedded crystals.

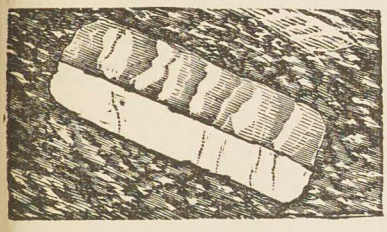


Fig. 57. Porphyritic Gneiss 5 cents to 50 cents.

Fig. 58. Oriental Verd Antique, 50 cents to $1.00

FELSITE is compact, uncleavable orthoclase, having the texture of jasper or flint, which it much resembles. It often contains some disseminated silica. It occurs of various colors, as white, gray, brown, red, brownish red and black, and is sometimes banded. It is distinguished from flint or jasper by its fusibility. Felsite is the material of beds or strata in some rock formations, and also of dykes or masses of eruptive rocks. The vicinity of Marblehead, Mass., is one of its localities. It is the base of much Red Porphyry, of Egyptian Porphyry or Rosso Antico. 50c. to $1.00.

Fine specimens of Sphaerulitic Felsite, 5 cts. to 25 cents.

As I have sold over $7,000 worth of Amazon stone in the last 8 years, I am certain that my customers will all be interested in the following items in addition to what is given on the preceeding page.

Amazon Stone, Microcline.

The locality is 40 miles from any village, 7 miles from any travelled road, and for this distance the road has been built through high peaks of the Rocky Mountains in order to bring the Amazon stone out. No ores have been found in connection with it, although the country has been burrowed by practical miners for the last 20 years. The rock in which the Amazon stone is found is a very porous, graphic granite, containing no veins of any sort, and Amazon stone is found entirely in surface pockets, all of which have run out at a depth of 8 or 10 feet. The deposit extends over a limited area beyond which the most energetic prospecting has failed to reveal much more than a few traces of color. And as I am a practical collector of 20 years experience in the Eastern, Western, Northern and Southern States, I feel that I can confidently say that the locality is virtually exhausted. I am selling crystalized Amazon stone for about one-hundreth the price that it was ever sold, before 1875 when this locality was discovered. I visited the locality before any, except surface specimens, had been removed, and have since that time made six trips to it. So I have nine-tenths of all the specimens now offered for sale in stock. I still furnish good crystals at from 50 cents to $50.00; slabs and pieces 5 cents to 50 cts. Many of these are sold for less than the cost of cleaning and freight.

The following account of the coloring matter is given by Dr. Konig, in the Proc. Acad. Nat. Sci. of Phila. for 1876.

"DR. GEORGE A. KONIG spoke about the coloring matter of the *Amazon stone* from Pike's Peak. This beautiful mineral has lately been obtained in large specimens and in considerable quantity through the exertions of Dr. Foote, who furnished the author with the material for this investigation. The color of the Amazon stone from Pike's Peak varies between a light bluish-green and a dark emerald-green. On many specimens the faces of modification, as prisms and domes, are without color, yellowish, or flesh-colored. The interior of very large crystals is likewise of a much lighter color generally than the outside.

Assuming the coloring principle to be a compound of iron, the following experiments were made to test the value of this hypothesis:—

1. Fragments were exposed to the action of boiling hydrochloric acid and aqua regia for several days, until the liquid was free from iron. Under this treatment the intensity of color was increased, the coloring substance withstands, therefore, the action of the above agents.

2. Fragments, prepared by the treatment described, were placed in a glass tube, and hydrogen passed through the latter at a red heat. After cooling, the mineral was found possessed of an evenly spread *gray color*.

3. The same pieces were now treated with oxygen at a red heat, and exhibited, after cooling, an even *rose* color, the intensity of which was proportional to the intensity of the green.

4. Green fragments were heated in an atmosphere of dry chlorine at increasing temperatures. No change occurred until at a red heat, when the mineral became perfectly white, and a slight sublimation of ferric chloride was noticed.

5. The rose-colored pieces become white when boiled in strong hydrochloric acid.

6. Thin fragments do not show at any place a concentration of the green color, when examined under the microscope.

7. Heated in the outer flame of a Bunsen burner, the same effect is caused as in the current of oxygen, but with a less brilliant color.

These experiments prove—

First. That the basis of the coloring substance is *iron*.

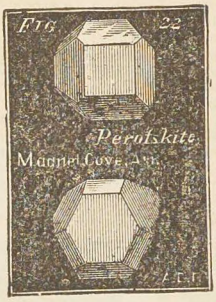
Second. That the iron is present as a very stable compound, probably as an organic salt.

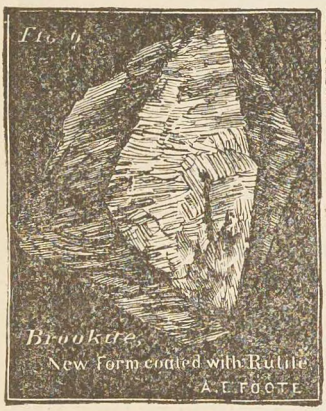
Third. That the coloring substance is not in molecular combination with the feldspar; because, if it were so, the iron could not be extracted completely by hydrochloric acid from a solid piece after oxidation; but that the color is of later date, and caused by infiltration into the numberless capillary cleavage fissures of the mineral.

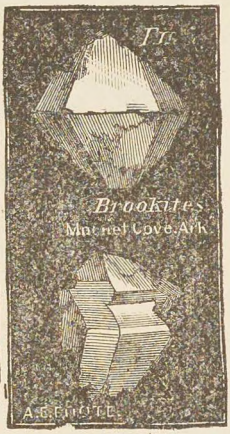
Investigation into the composition of the organic acid is reserved for a future communication.

These have for many years past possessed the highest interest to mineralogists, partly on account of their rarity, partly on account of the obscurity of the reactions of Titanium, [it is not many years since it was first recognized] but mainly on account of the very remarkable trimorphism that is illustrated by Titanic acid under the names of Brookite, Rutile and Anatase, and more recently the remarkable Paramorphism [treated of by Vom Rath on next page,] of Rutile after Brookite, and the discovery of a new form of Brookite.

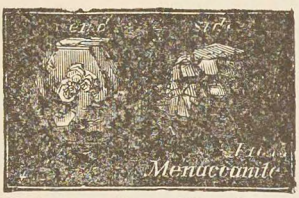
The influence that the *mere collecting* of minerals has upon the progress of Mineralogy and Chemistry is shown by the following statistics, taken from Prof E. J. Hallock's Index to the Literature of Titanium. See No. 13358 in Chemistry book list. The discovery of the Magnet Cove locality by a collector gave rise to seven papers on Titanium in 1849, which was more than three times as many as there were in 1848. In 1874 I visited the Magnet cove locality, and the number of papers in '75 was twice as great as in '74. The mineralogical papers of 1876 were four times as great as in '74, and the papers of '77 were far more numerous than those of '75 or '76. Such is the record, and yet how often some pseudo-scientist says of a gentleman of taste and means who has satisfied his love for the beautiful with works of absolute perfection instead of copies on canvas, "*Oh! he is a mere collector!*" True scientific men appreciate the value of such collections, and even if poor manage to have them at their command. I am selling Brookite, rosettes of Rutile, Perofskites, &c., at less than half the price they were sold at before I visited the locality in 1878. Good Brookite crystals, perfect on every side, 15c. to 5.00. Specimens on the gangue, 25c. to 5.00. Rutile and Brookite, nearly pure, 25c. a lb. Specimens of Schorlomite, 15c. to 3.00. Menaccanite crystals, 5c. to 2.00. Perofskite crystals 10c. to 5.00. Hydrotitanite crystals 25c. to 5.00. Rosettes and Masses of Rutile, 15c. to 5.00.







Rutile in Quartz Fleche d'Amour, Arrows of Love, or Venus Hair Stones are the names applied to the charming specimens containing long needles of Rutile penetrating Quartz. Specimens from 25c. to 5.00. Anatase, 50c. to 5.00. Titanite or sphene, 10c. to 3.00.



Quite full details of the various Titanum minerals given in the table of species. The geniculated ["genu a knee"] rosettes of Rutile from Magnet Cove are the finest in the world.

Rutilus signifies shining red, and my rutile from Georgia and Pa. is so, but that from Ark. is the black variety called Nigrin. The various forms of Titanic acid are used by dentists in manufacturing porcelain. As I have sold over $1,000 worth of titanium minerals in the last five years, I am certain my customers will be interested in the following:

Proc. Acad. Nat. Sci., Phila., May 9, 1876.

Hydrotitanite.—A New Mineral.

Dr. George A. Konig.

The crystals of perofskite, pure octahedrons, or octohedrous modified by the cube, are often found to have yellowish-gray spots much softer than the rest of the minerals, and, in some instances, the whole crystal is composed of the same yellowish-gray substance. The specific gravity of one of these crystals was found to be 3.681; nearly 0.2 less than the fresh mineral. An analysis of the same made with 0.5 gramme, gave the following:

By metamorphic action, nearly all the calcium and some iron have been removed, and water added. The result is a new mineral for which the name Hydrotitanite is here with proposed if the analysis of more specimens should prove the constancy of the composition [as it has, 1880. A. E. F.]

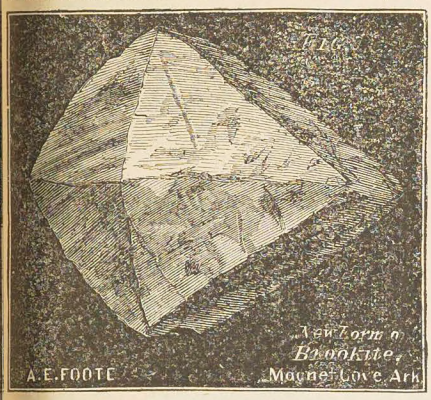
TiO_2	=	82.82
Fe_2O_3	=	7.76
MgO	=	2.72
CaO	=	0.80
H_2O	=	5.50
Vd		Undet
		99.60

Dr. Konig also called the attention of the Academy to the occurrence of opaque nuclei observable in microscopic slides of garnets, in which, by analysis, 6 per cent. of Titanic Acid was found. He had obtained recently, through the kindness of Dr. Foote, a fragment of a garnet crystal, weighing about three ounces, on which the faces of the dodecahedron are visible, and concentrically a nucleus, contrasting by its bright pitchy lustre, with the dirty circumferential part of the crystal. The line of contact is apparently very well defined, but on producing on it a fresh fracture, no difference in color and lustre, and no line of division can be seen. The streak of the centre is reddish gray, that of the circumference light greenish gray. Starting with the hypothesis of a gradual change from inside towards the outside, or, *vice versa*, a cut was made through the crystal, about parallel with one of the principal planes of symmetry, and thus a slice was obtained half an inch thick; this was divided radically into three sections, and one of these was cut into five parts at equal distances from the centre.

PARAMORPHOSIS OF RUTILE AFTER ARKANSITE.

BY PROF. GERHARDT VOM RATH.
(*Poggendorff's Ann. CLVIII.* 1876.)

TRANSLATED FOR THE BULLETIN BY PROF. G. A. KOENIG, PH. D.



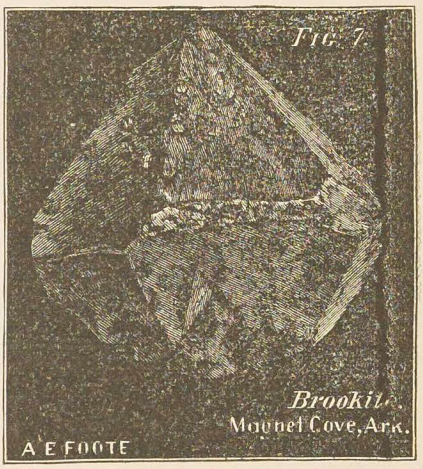
Some crystals of arkansite from Magnet Cove, which I obtained some time ago through Mr. B. Hürtz. are in many respects very remarkable, and different from those usually obtained at the above locality. They present generally the seemingly dihexahedric form, resulting from an evenly-balanced combination of the prisms with the pyramid, but also forms in which the prism M is largely predominating, as in the accompanying figure. They are further distinguished by a brown color and a curious lustre resembling very much that called "moire metallique" by the French. The faces do not reflect in their corresponding plane, at least not over their entire extent. They show, on the contrary, a spotted appearance of alternating lustrous and dull patches in one position, and at another position a reversion of lustre and dullness on the same spots. As several parts of neighboring faces reflect simultaneously it is demonstrated that the reflecting elements on different faces are in corresponding position. This phenomenon is similar to the one noticed in some iron meteorites after etching. The satin-like lustre, moire, or false rife is always the result of the formation of new, more or less parallel crystallographic elements in the primary substance. On closer examination, the surface of these arkansites or brookites resolves itself into innumerable small crystals of RUTILE, whilst at the same time the interior is not any more black arkansite, but dark reddish brown rutile. A clear case of paramorphosis of rutile after brookite is thus made out, strengthened by the change in specific gravity. I made several determinations with good-sized crystals and found,

Spec. Gr. 4.148—4.212.

agreeing closely with that of rutile (4.18—4.25). Often the rutile crystals are so small that neither their form nor their position can be ascertained with either naked eye or magnifying lens. But they may be recognized by the variation of lustre, which is silky on the prismatic faces and adamantreous on those of the pyramid. Most usually, however, the rutile crystals are large enough to allow an identification of their form (P.∞ P. ∞ P. ∞ P. ∞ ∞ $P\frac{3}{2}$) and also their relative position. On one of the specimens before me, (an aggregation of numerous pseudodihexahdric arkansites) some rutile prisms are as long as 5 millimeters, and have evidently attracted the attention of a former observer, as the American label reads: "arkansite with an habit of rutile." However, there is not only a covering of the crystals with rutile, but a thorough physical change through their entire mass. From what has been said above, it follows that the rutile crystals possess a parallel position by groups, and not only towards each other, but likewise towards the arkansite, whose form they imitate. There is a tendency of the small crystals to arrange themselves parallel to certain main planes of the mother crystal. This is not a twinning in the more restricted sense, but merely a kind of similarity in the direction of certain axes or edges. The directing force which the arkansite (dwindling in its essence) exercised upon the epigones of rutile is unmistakable. The position of the rutile prisms on the faces M is mostly vertical in a manner that a face of the prisms of the second order would

coincide with the macropinakoid of the arkansite. The position is only approximately parallel, and often interrupting. In another position the small crystals are placed across the bracby diagonal edge of the pyramid. It is curious how the moire design assumes irregularly rounded shapes (resembling the lustreless twin-spots in quartz), and again, patches bounded by straight lines, which pass from one face to the other with the same position of the splendent elements.

Thus we have, then, presented to us a new and notable example of the fact that two dimorphous modifications of one and the same substance occur in the physical appearance of one body, the one having left the outlines of its crystallographic form as a memento of its existence, whilst the second dimorphous modification is manifest in the smaller crystals of subsequent formation. This paramorphosis is analogous to one known heretofore and described by Dr. Blum, (III. Nachtrag zud. Pseudom. des Mineralreutus, p. 264) that is the transformation of octahedrite (anatose) into rutiles.



The new form that Prof. Vom Rath describes was noticed by me soon after I first visited Magnet Cove, and the figures that illustrate it were engraved about one year ago. The material upon which he made his exceedingly interesting observations passed through my hands. The brookite shown in fig. 7 was obtained by me nearly two years ago, and the actual size is shown. I have specimens of this rare form at from 25c. to $5.00 each.

I desire again to call attention to the exceedingly low rate at which I sell Rutile and Brookite, 25c. each, free from gangue. *Shadow or Phantom crystals* from Hot Springs, some of which are very beautiful, I can furnish at from 25c. to $2.00.

[*From Proceedings of the American Association for the Advancement of Science. Published at Cambridge, 1873.*]

4. On Zonochlorite, a New Hydrous Silicate from Neepigon Bay, North Shore of Lake Superior, Canada.

BY A. E. FOOTE.

In 1867, during a natural history excursion through that portion of British America that borders upon the north shore of Lake Superior, I examined some minerals in possession of one of the traders of the Hudson Bay Company.

Most of these were varieties of quartz, but among them was what he called a green agate. I succeeded in obtaining a very small piece from him. This I examined in the Winter of 1867 and 1868, and pretty fully satisfied myself that it was something new. The specimen that I had was too small to admit of quantitative tests, and I therefore postponed making public my discovery. In the summer of 1868 I organized an exploring party of thirteen men, having for my main object the discovery of the locality of this mineral. In this I fully succeeded.

It occurs in the amygdaloid trap on the shore of a small island which lies off the mouth of Neepigon Bay; the largest bay on the north shore of Lake Superior.

It is associated with laumonite, stillbite, prehnite, quartz in the varieties amethyst, agate, carnelian, copper, datholite, and calcite. The mineral is found massive, banded with different shades of dark green. It has a hardness of 6½ to 7¼, and is quite tough. Its specific gravity is 3.113, on the average of 16; highest 3.157, lowest 3.042.

(The following analysis by Mr. Hawes, Instructor in the Sheffield Scientific School of Yale College, differs but very slightly from mine, mainly in that I got nearly 8 per cent. of ferric oxide. Owing to the embarrassing circumstances under which I made my analysis, I have more confidence in his results than in my own.

Silica, 35.94.
Alumina, 19.41.
Ferric Oxide, 6.80.
Ferrous Oxide, 4.54.
Lime, 22.77.
Magnesia, 2.48.
Soda Trace, Water, 8.40.

Total, 100.34.)

Heated in a test tube, its powder yields water, and becomes brownish-white. The thin edges fuse with difficulty to a dark glass.

With borax and the fluxes it gives reactions of iron. In HCl it dissolves, with the separation of silicic acid, as a fine powder. The water was determined by igniting the powdered mineral in a glass tube ten inches long, closed at one end, and a quarter of an inch in calibre.

The water was condensed in the tube, and was removed by evaporation. It was found that less than one-tenth per cent. was lost by volatilization.

The average of a number of estimations gave as the percentage of water 8.7; the highest, 12.9; the lowest, 7.03.

The lime, silica, iron, and alumina were estimated by the ordinary methods detailed in Fresenius. The physical characters of the mineral seem to me to be so marked as to be sufficient to indicate a new mineral; and this also is the opinion of Professors Gustav Rose and Des Cloiseaux, as well as of many others to whom I have shown it.

On account of its hardness and toughness it is susceptible of a high polish, and may be used as a gem. I propose the name "Zonochlorite," from *zona*, a band, *chloros*, green, and *lithos*, stone.

Paper Trays with linen bound corners per hundred, 6x4 inches, $1.00; 4x3 inches, 75 cents; 2x6 inches, 75 cents; 2x3 inches, 65 cents.

Embolite, Silver Chlorobromide.

In December of 1875 I took two old and experienced prospectors and Collectors down into New Mexico, and after much exploration, leased a silver mine some miles from Silver City, from which we took out the best embolite specimens ever offered for sale in this country. I have good illustrative specimens from 25 cents upwards, according to the coin value. I sell good characteristic specimens at from 25 cents to $2.50 each, and I believe that no bromine mineral has ever been offered at such low rates. $6.00 per lb. I have also crystalized cerargyite from the same locality.

Graphite in distinct hexagonal prisms from northern New Mexico. Pieces of any size from 10 cents to $5.00 in value.

TITANITE OR SPHENE.

The latter name, and the one most commonly in use, is derived from the Greek word for wedge referring to the form of the crystals (Fig. 1 & 2). The name, Titanit, given by Delametherie in 1787, was given four years before Wm. McGregor found the red metal in the Cornish slags. Thompson gives the credit to Dr. Wollaston, but McGregor's discovery was published in Crell's Ann. 1, 40, 103. It is almost the eldest of the titanium group, for it was only four years earlier that De Lisle discovered Rutile, or red tourmaline, as he called it, and it was ten years later before Nigrine, (long considered scarce, but which I have obtained in large quantities at Magnet Cove, Ark.,) the other variety of Rutile was discovered. About the same time Klaproth analyzed Titanite, making the first accurate analyses of a titanium mineral.

Cleaveland, our American Nestor, (following Daubenton, 1799) calls Titanite, Silico-calcareous Oxide of Titanium, which well expresses its composition, the formula being, according to Brush, ($Ca\,O + Ti\,O_2$)$Si\,O_2$.

Its crystallization is monoclinic, the most common forms being those illustrated in this article, and modifications of them (Fig. 3 and 4). Twins are usually much more wedge shaped than the simple crystals see Fig. 5. The twinning plane is *i-i*, but the enormous twin crystals which I obtained in Renfrew Co., Canada, nearly all have the faces 4 *i* S very much prolonged so as to make them take up nine-tenths of the surface of the crystal.

Cleavage, Dana says: *I* sometimes nearly perfect; *i-i* and 1 much less so, rarely 2 easy,—2 less so." The cleavage of the Titanite from Renfrew is so very remarkable that almost without exception our best mineralogists all mistook its brilliancy for that of a crystal surface. Specimens from this locality show cleavages in the direction of 2, and sometimes in the direction of *i-i*, so brilliant that they might be mistaken for crystals like Fig. 1, instead of being "rarely lamellar," nearly all found at the Renfrew locality, even when in masses of several hundred pounds, is very strongly so, the lamellæ sometimes being very strikingly waved and contorted.

The Renfew Titanite is clove brown, and this is the common color.

The Lederite (Fig. 3), which I obtained at Natural Bridge, Lewis Co., N. Y., is this color, as also is the Semelene, grains of titanite, looking, in color and shape almost exactly like flaxseed, and scattered through white quartz and scapolite at the same locality.

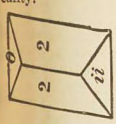


Fig. 1

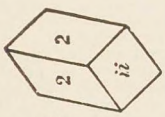


Fig. 2

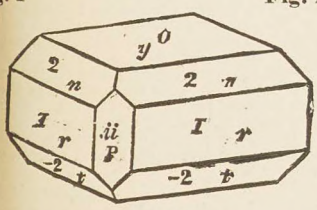


Fig. 3

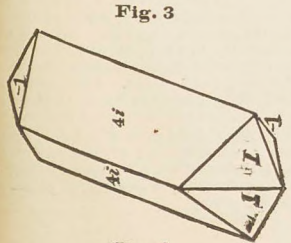


Fig. 4

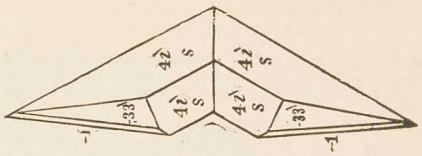


Fig. 5

In 1876, Dr. Forwood presented to the Academy of Natural Sciences, of Philadelphia, very beautiful and translucent yellowish-green crystals of sphene from Delaware Co., Pa. They are also found black, yellow, and gray.

The manganesian or Greenovite variety is red or rose colored, lustre resinous, very bright. The streak is white, sometimes reddish. Transparent—Opaque Fracture imperfectly conchoidal, uneven, brittle. Before the blowpipe some varieties change color, becoming yellow and fusing with intumescence, at or below 3, to a blackish glass. A clear, yellowish-green glass, with borax. The partial solutions with H Cl give a violet reaction when boiled with tin, owing to the separation of titanic acid. Titanite is one of our most widely distributed minerals. Besides the localities already mentioned, very beautiful green crystals are found in the Alps and at very many places in the U. S., but none of the old localities will compare with the newly discovered ones in Renfrew Co., Canada. Good crystals from Renfrew, 15c. to $25.00, Fine Cleavages, 5c. to $2.50; Lederite crystals, 15c. to $3.50; Semelite, 10c. to $1.50: Massive Titanite, 25c. a pound, pure. Mixed with rock, 10c. a pound. See catalogue for prices of other titanium minerals.

———o———

White Garnet.

SHEFFIELD SCIENTIFIC SCHOOL OF YALE COLLEGE,
NEW HAVEN, CON., July 17th, 1881.

DEAR SIR.—The garnet from Hull which you sent me last spring I succeeded in picking sufficiently pure for analysis, and Mr. Marcus D. Munn, of the Sheffield Laboratory, under Prof. O. D. Allen, found it to be a lime alumina garnet, very near in composition to the white garnet from Oxford, Canada, analyzed by Dr. T. S. Hunt, and the white one from the Urals, analyzed by Croft. (See Dana 5th ed. p. 267, analysis 1 & 3.) It contained but about 1 per cent. of iron. Mr. Munn's analysis gave:

Silica	39.85
Alumina	22.07
Ferric-oxide	1.13
Lime	36.31
Magnesia	0.63
	100.04

Respectfully yours,
GEO. J. BRUSH.

Dr. A. E. FOOTE.
Crystals 5c to $5.00.

"THE Bergen Hill Tunnel is famous for the abundance, beauty, and variety of the Minerals which it brought to light. Datolite, Pectolite, Calcite, Analcite, Apophyllite, Natrolite, Stilbite, and others were obtained there during its excavation, in a degree of perfection rarely equalled by the productions of any other locality."

[Dr. E. S. DANA, in the *American Journal of Science and Art*, Vol. IV., July, 1872.]

In the excavation of the new tunnel of the Delaware, Lackawanna, and Western Railway, west of Hoboken, which is now approaching completion, an opportunity has been afforded to mineralogists for obtaining some rare minerals. They were first brought to light in this locality some years ago, when the Erie tunnel was made, and specimens were sold by collectors at large prices. The Palisade Ridge is a volcanic formation called a trapdike. It is in the seams and cavities of this rock and deep below the surface that these crystalizations are sparingly found, some of which are very beautiful.—*N. Y. Commercial Advertiser.*

All Bergen minerals mentioned above and others, at from 5c to $5.00 each.

[*Am. J. Sciences, March, 1878.*]

CRYSTALLIZATION OF VARISCITE.

PROF. ALBERT H. CHESTER.

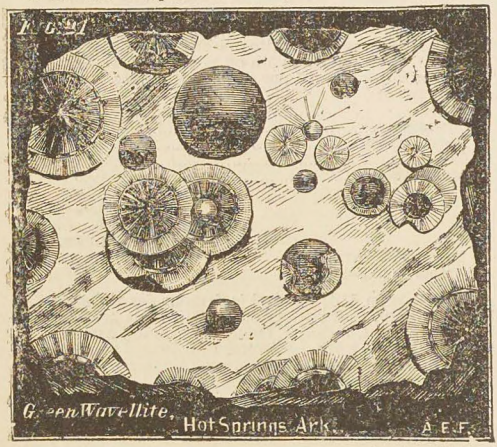
A Microscopic examination of certain small crystals of the mineral variscite, from Arkansas, reveals the following facts with reference to its method of occurrence and crystallization.

Fig. 2.

The crystals are rarely distinct, but are usually found in complicated groups, sometimes forming clusters of a sheaf form. Very rarely single prismatic crystals are found, sufficiently distinct to admit of measurement. Figure 1 gives the most common form, belonging to the orthorhombic system, and showing faces of I, ū, u and O. In this crystal $I \wedge I = 114° 6'$. In general, but one termination is seen, but crystals showing both ends are sometimes found on the quartz matrix, the bases being similar to each other The face ū is very small and therefore easily overlooked, and ū is about the same size as I, so that these crystals may readily be mistaken for hexagonal prisms. Crystals showing a simple termination like that in Fig. 1 are seldom seen. More frequently the basal plane is like fig. 2, or still more complicated. These planes are often covered with a thin opaque white coating, probably of quartz.

A striking peculiarity of this mineral is its high lustre, like that of beryl, which it much resembles when viewed under a low power. The crystal figured above is 0·3 mm. in diameter, and is about the average size of those examined. —*Hamilton College Laboratory, January 19, 1878.*

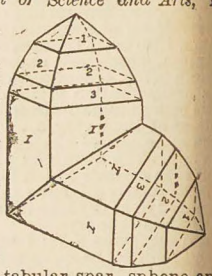
I have good specimens of this beautiful mineral which was so rare that, although it was described and named in 1837, enough of it was never obtained at the European locality for analysis. I sent Prof. Chester the material for the first analysis ever made.



His careful analyses, republished from the Am. Jour. by us, proved that though originally called Peganite, it is the Variscite of Breithaupt and the Callainite of Damour. It occurs at the same locality as the green Wavellite. As a rule the two are not associated, and the Variscite is a much lighter, brighter green than the Wavellite. The latter almost invariably shows radiating surfaces. More rarely globular masses are found. I can furnish large showy specimens at from 50c. to $5.00. Small, good specimens at from 10 to 50 cents. I have just broken up a large mass of green Wavellite that I had exhibited at the American Exposition in London. In it were cavities lined with balls of terminated crystals that I can sell at from 50c. to $5.00. Surfaces showing radiations, 5 to 50 cents.

Twinned Crystals of Zircon.

As will be seen from the annexed quotations from the Proceedings of the Mineralogical Section of the Academy of Natural Sciences of Philadelphia, I was the first to put on record the discovery of twinned crystals of Zircon at an American locality. I have not heretofore thought it necessary to give a history of this matter in the LEISURE HOUR and should not do so now were it not for the fact that others have claimed credit for putting the discovery on record and even for the original observation. In this connection it is interesting to notice that in spending a pleasant half day in looking over Prof. Brush's exceedingly valuable private collection he called my attention to a minute but clear twin of Zircon from that remarkable locality, Branchville, Ct. We are indebted to Mr. W. E. Hidden for the following figure which was engraved by him for the *American Journal of Science and Arts*, in which it was published June, 1881, and is there marked "communicated March, 18th." As will be observed we communicated the fact of the twins of Zircon at the first meeting, Sept. 27th, 1880, of the Mineralogical Section of the Academy of Natural Sciences, which was held after the summer intermission, which commenced with July, 1880



My trip to Canada in 1880, was designed especially to collect large crystals of tabular spar, sphene and Zircon, and in this I was very successful. The only twin crystals of Zircon which we saw during July were in the hands of a Phosphate Miner, and I mentioned the fact to members of the American Association at the meeting in Boston in August, and was invited to give an account of the Canadian locality before one of the Sections. but as the time was already well filled, I did not do so. I had distributed fragments of the Zircon crystals among the miners in Renfrew, and around Ottawa and Perth, and the result was that before January I had received twinned Zircons from Renfrew over an inch and a half in length.

Proceedings of the Mineralogical Section of the Academy of Natural Sciences, page 16, September 27th, 1880

"*A new locality for sphene.*—Dr. A. E. Foote, described the new locality for sphene, and associated minerals at Eganville, Renfrew Co., Canada. The sphene occurs in immense crystals, weighing from 20 to 80 lbs., in a vein of apatite 20 feet wide. Many other veins of smaller size occur in the same county. The rock is principally Laurentian gneiss and granite. A solid mass of sphene, very highly cleavable, (5x2x2), was observed in the side of the vein. It yielded several hundred pounds of sphene. Close by it doubly-terminated crystals of scapolite, weighing over 50 lbs., and crystals of pyroxene, weighing from 12 to 30 lbs., were found. Phlogopite and Zircons, some of them twinned, occur at the same locality. From the enormous size of all the crystals found in this county, it must rank as one of the most remarkable mineral localities known. When the vein, 20 feet wide, spoken of above, was discovered, a doubly-terminated crystal of apatite, weighing 500 lbs., and bright upon the surface and ends, was said to have been found.

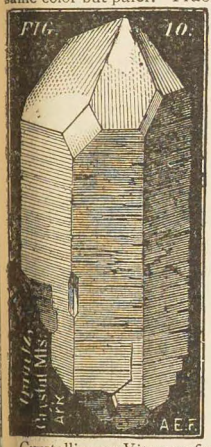
January 24, 1881.

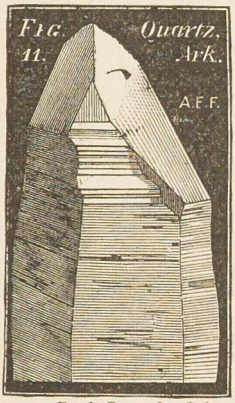
On Twin Crystals of Zircon.—Dr. A. E. Foote, recorded the discovery of perfect twin crystals of Zircon, near Eganville, Renfrew Co., Canada. He had obtained small but imperfect twin crystals over four months before, but not sufficiently distinct to establish the character of the twinning at the time. As in cassiterite and rutile, the twinning plane is 1—*i*. It is doubtful if twins of Zircon have ever been seen before."

We have still an abundance of sphene, apatite, pyroxene, zircon, scapolite, and all the other Canadian minerals we have so often advertised before, of any size, degree of perfection, or beauty, at prices ranging from 5c. to 25.00.

QUARTZ, SI.

Name probably derived from the German, signifying the grating sound made by clay in kneading it. Hexagonal. In slender six-sided prisms attached by one end and terminated by a six-sided pyramid. Sometimes short and doubly terminated. Prism faces commonly striated. Modification given below most common. Usually stated that it is not cleavable, but I have specimens from Arkansas that show very distinct cleavage parallel with both pyramidial and prism planes. Massive granular, stalactitic and concretionary forms. Colorless if pure; often shades of yellow, red, brown, green, blue, violet, black. Lustre vitreous, sometimes nearly resinous; splendant-dull. Transparent-opaque. Streak white if pure, but if colored same color but paler. Fracture conchoidal with very sharp edges. Tough, brittle or friable. H. 7. G. 2. 5—2, 8. Infus. Insol.





Crystalline or Vitreous forms. 1. Rock Crystal. Colorless, usually transparent. This is the most widely distributed of all minerals, and owing to its great beauty the first usually collected. It is found in all parts of the world, but Arkansas, Brazil and Switzerland give us the finest crystals. They are sometimes of great size. From Arkansas I have obtained crystals nearly a foot in diameter, and I have now one group in the Permanent Exhibition that is about 4 feet by 3 in superficial area. It is far finer than anything exhibited last year from Brazil or Russia. The crystals are as clear as water. The larger crystals are usually opaque. A group in the University of Naples weighs nearly ½ a ton. A crystal at Milan is 3½ feet in length, 5½ feet in circumference, and weighs 870 pounds. About a century ago one cavity at Zinken produced crystals that sold for $300,000. From Herkimer Co., N. Y., are obtained remarkably clear doubly terminated crystals containing liquid and other impurities. Along the Upper Mississippi are found round masses of quartz which when broken open show cavities lined with beautiful crystals. A group which I exhibit at the Permanent Exhibition is nearly 2 feet in diameter. The waters of the wonderful geysers of the Yellowstone National Park contain silica in solution, and have formed some very fine mammillary and stalactitic shapes upon a base of translucent Chalcedony. I purchased about 5,000 pounds from the Specimen Mt., and have one mass weighing over 300 pounds on exhibition at the Permanent Exposition. Groups of crystals are highly valued in China and Japan as ornaments for the apartments of the rich, and bring enormous prices.

It is very much employed for spectacle glasses, being far superior to glass, as it is not liable to lose its high polish. It is also used in optical instruments. When used for such purposes it is commonly known under the name of Brazilian Pebble. It is also much used for ornamental purposes. In India the natives hollow it out in cups, globes, and vases. They believe it to be the mother or external husk of the diamond, and call the crystal the unripe and the diamond the ripe diamond. The Chinese do not cut it as well as the natives of India. The Japanese cut it into large round balls used for cooling the hands, for like all true stones it feels much cooler than glass or paste.

The Greeks supposed it to be water congealed by intense cold, as the name (κρύσταλλος, ice) signifies, and believed it could only be found in the far north. In the middle ages it was believed to be incapable of containing poisons, and that it would betray their presence by breaking or becoming obscured, consequently cups and goblets made from it were highly esteemed, being frequently covered with the most beautiful ornamentation. The Emperor Nero is said to have possessed two magnificent crystal cups, engraved with subjects from the Illiad, which cost an enormous sum. When his downfall took place he destroyed them that no one else might drink from them.

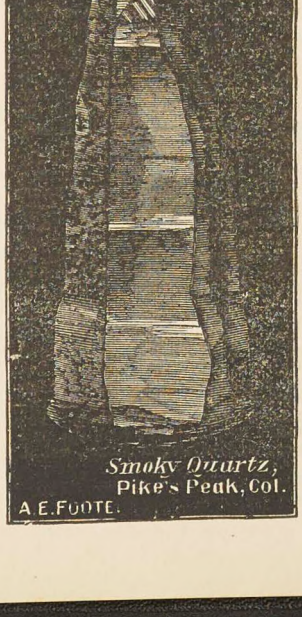
The large round balls, under proper manipulation, were supposed to possess magical powers, and to disclose events which were to happen, and show persons who were distant. The famous crystal globe of Dr. Dee is an illustration of this belief. Crystal was used in powder, mixed with wine, and given in cases of dysentery. Pieces also were held against the tongue in fevers to assuage thirst. For this latter purpose it is still considered useful.

The green, pink and other colored quartz beads sold at summer resorts are formed by heating the crystal to redness and then throwing it in various colored solutions. The sudden cooling causes the crystal to crack all through and the liquid penetrates the fissures. Owing to their minuteness the crystal seems to be uniformly colored. In 1791 the quartz crystal treasures of the crown of France were valued at over $500,000 of our money.

Arkansas crystals, 5cts. to $150.00; Herkimer Co., N. Y., doubly terminated, from 10cts. to $5.00.

Geodes from Upper Mississippi, 10cts. to $5.00; Yellowstone National Park specimens, based on chalcedony, 10cts. to $15.00.

2. *Asteriated Quartz* contains within the crystal radiations. 3. *Amethyst.*—The clear purple or bluish violet color is supposed to be due to Manganese. Name from the Greek, α μεθυω, "not to intoxicate." Pliny mentions the belief that the name arose from its approaching the color of wine but not quite attaining it. It was very highly esteemed during the middle ages as a gem, being supposed to dispel sleep, sharpen the intellect, and be an antidote against poison. It is now very much esteemed on account of its beautiful color and brilliancy. It also has the merit of appearing remarkably well with mourning. Set with pearls and as little gold as possible, it appears to the best advantage. Diamonds appear well with the deepest colors. Various violet colored stones, like sapphires, fluor, &c., were called amethysts by the ancients. The finest specimens come from Thunder Bay, Lake Superior, Yellowstone National Park, Brazil, India and Persia. In the Permanent Exhibition I exhibit an amethyst geode which was evidently originally the trunk of a tree. It is of a beautiful color and is surrounded by agate; from Yellowstone National Park. It is in two pieces. One about 15 inches in diameter and two feet long, worth $50.00, and one about one foot thick and 20 inches long, worth $20.00. I have many smaller specimens on a beautiful chalcedony base at from $1.00 to $5.00 each. From Thunder Bay I have remarkably fine specimens varying in size from an ounce to 150 lbs., and in price from 5c. to $50.00. Many of these are exhibited at the Permanent Exhibition. 4. *Rose.*—Rose-red or pink, fades on exposure or heat, massive, sometimes opalescent and usually much cracked. Colored by titanic acid or manganese. Used as a gem. When of good color and cut it is sometimes sold for pink spinel, but the hardness easily distinguishes it. 5. *Yellow, False Topaz, Citrine.*—As yellow as topaz, but, unlike it, has no cleavage. It is also distinguished by its superior hardness. A very large portion of the gems called topaz are only citrine. 6. *Smoky, Cairngorum. False Topaz.*—Smoky yellow to smoky brown, and sometimes transparent. Brownish black crystals are usually opaque. The color, which is easily destroyed by heat, is supposed to be due to organic matter. This stone is very well suited for a mourning stone on account of its color. It is very much used, especially by the Scotch, who gave it the name cairngorm (grief at the grave.) The finest specimens are found at Pike's Peak Colorado, and Switzerland. I have at the Permanent Exhibition a smoky quartz crystal over four feet long and one foot in diameter. It is worth $75. Other specimens of every size and price, from 5c. upward. Crystals can be ordered at the rate of 10c. per inch.



7. *Milky.*—Nearly opaque; sometimes with greasy lustre, and then called *greasy quartz.* Occurs in mountain masses, called improperly *white flint*, and used for glass making. 8. *Catseye.*—Fibres of asbestus penetrating the quartz give it a beautiful opalescence, but no prismatic colors. It can also be distinguished from the chrysoberyl by its inferior hardness and specific gravity. Used as a gem. Colors yellowish, greenish, greyish or red. 9. *Aventurine* is spangled with scales of mica, &c. Used as a gem, but the artificial is much more beautiful. 10. *Impure from the presence of other minerals. Ferruginous* either red or yellow, *Chloritic, actinolitic, bituminous, arenaceous* enclosing clay, *micaceous*, &c. 11. *Saginitic.* Containing acicular crystals of other minerals. Those containing rutile are called by the French Fleches d'Amour or Venus' hair stone, Cupid's net or Love's meshes. I have very handsome specimens of this from North Carolina and Switzerland. The finest one I have ever known is one from N. H., that I purchased in the Chilton collection from Tiffany & Co. The same names have incorrectly been applied to quartz, containing hornblende, epidote, actinolite, tourmaline, gothite, asbestus, &c. 12. *Containing liquid in cavities.* By changing the position the liquid is seen to move if the cavity contains air. The liquid is either water (with or without soluble substances) $C O_2$ or petroleum-like substances. Very good specimens are found at Herkimer County, N. Y., and Hot Springs, Ark.

CRYPTOCRYSTALLINE VARIETIES. 1. *Chalcedony* is quartz with a little opal through it. White to black, grayish, pinkish, bluish. Waxy lustre, translucent, sometimes transparent. Much tougher than quartz and with a more even fracture. Found lining geodes. I exhibit very beautiful specimens from the Yellowstone National Park, Fox River, Illinois and Iceland. Much used as a gem, especially for engraving. Various forms of it are used for chemical apparatus, as mortars, pestles, &c., also for burnishers, handles of various kinds, &c. Stalactitic and mammillary forms are common. A curious hacked form from Yellowstone National Park.

2. *Carnelian* is clear red chalcedony grading into grayish red. Sometimes supposed that the color is due to organic matter, but it is owing to the presence of iron, Heintz having found, by analysis, that Carnelian contains a small quantity of it. Thus:

Peroxide of iron	0.050
Alumina	0.081
Magnesia	0.028
Potash	0.0043
Soda	0.075

The best specimens are of a perfectly uniform color, free from undulations and the muddiness to which European specimens are liable.

Carnelian is susceptible of a high polish, and, for that reason, and the brightness of its color, it has always been a favorite substance, much used for seals, brooches, rings, necklaces, &c., both in ancient and modern times.

"Generally, all Rubies be verie hard for to be cut, and this ill qualitie they have, That they never doe seale cleane, but ordinarily plucke some of the wax away with the signet: contrariwise, the Cornalline or Sarda, signeth verie faire without any of the wax sticking to it."

"In old time, there was not a precious stone in request, than the Cornalline: and in truth, Menander and Philemon have named this stone in their Comœdies, for a brave and proud gem: neither can we find a pretious stone that maintaineth the lustre longer than it, against any humour wherein it is drenched; and yet oile is more contrarie unto it than any other liquor. To conclude, those that be of the colour of honey are rejected for nought; howbeit, if they be worse than those."—Pliny, book xxxviii. chap. 7.

Forbes states that Carnelians, Agates and the beautifully variegated stones improperly called Mocha stones, form a valuable part of the trade of Cambay, to which place the art of cutting and polishing these stones seems to be exclusively confined. "The best Agates and Carnelians," he adds, "are found in peculiar strata, thirty feet under the surface of the earth, in a small tract among the Rajpipla hills, on the banks of the Nerbudda; they are not to be met with in any other part of Luzerat, and are generally cut and polished in Cambay. On being taken from their native bed, they are exposed to the heat of the sun for two years; the longer they remain in that situation the brighter and deeper will be the color of the stone; fire is sometimes substituted for the solar ray, but with less effect. as the stones frequently crack and seldom acquire a brilliant lustre. After having undergone this process, they are boiled for two days and sent to the manufacturers at Cambay. The Agates are black, white and red, in shades from the pale yellow to the deepest scarlet."—Oriental Mens., vol. ii. p. 20.

From the circumstance that the lustre of the stones becomes inferior when artificial heat has been substituted for that of the solar rays, it may be inferred that the change of color is not produced by the sun's heat alone, but that light, or the actinic ray, exercises considerable influence in producing the effect described. It may here be observed that the chalk-flints, which form the superficial gravel in many parts of this country, are very frequently of a bright red and yellowish-brown color, in fact, converted into Agates and imperfect Carnelians by long exposure to the sun's heat and light, and the consequent peroxidation of the iron contained in them. Polished specimens, 15 cents to $1.50.

3. *Chrysoprase*, name from χρυσὸς gold, and πρασον a leek. Apple-green Chalcedony colored by nickel. In Europe it is highly valued as a gem, and is made into brooches, rings, bracelets, seals, snuff-boxes, cane heads, &c. The apple-green variety is the most valuable. It should be cut *en cabochon*, as it is spoiled if cut in facets, and it appears to most advantage by candle-light. Chrysoprase is apt to lose its color and to become dark and cloudedif kept in a dry, warm situation, or if it be long exposed to the light of the sun; but the color may be restored by keeping the stone in a damp place, or in wet cotton or sponge, or even by dipping it into a solution of nitrate of nickel, which also improves the tints of inferior kinds.

The kings of Prussia used only to allow the works where it is found to be opened once in three years, and they monopolized most of the finest specimens; consequently, semi-transparent stones of a delicate color, fit for setting in rings, formerly fetched very high prices in Berlin and Vienna. The common people of Silesia wear Chrysoprase round the neck as a charm against pains.

It is found at Kosemutz, in Lower Silesia, imbedded in Serpentine, and associated with Opal, Quartz and Chalcedony. I obtained a quantity from a gentleman who brought it from Silesia. 25 cents to $2.00 per specimen.

5. *Prase*, πράσον a leek. Translucent and dull leek green. Same name applied to Crystalline quartz of same color. Sometimes cut, but of little value.

6. *Plasma.* Name from πλασμα an image. Bright green to emerald green. Subtranslucent. Sometimes dotted with white.

Heliotrope or Bloodstone is essentially the same with spots of red jasper looking like drops of blood. Used for seals, rings and many other ornaments on account of its beautiful color and great hardness. In the middle ages, the red spots were supposed to be the blood of Christ. The name heliotrope (from ἥλιος, the sun and τρεπω, to turn), was given it because when iummersed in a vessel of water, it was said to make the image of the sun to appear in it of the color of blood. "Out of the water the sun is seen in it as in a mirror, the eclipses of the sun become visible, and the moon is beheld to pass under the great star." Polished specimens, 10 to 75 cents.

Heliotrope or bloodstone is found near South Park, Col., Arabia, Siberia, &c. In the National Museum at Paris may be seen a head of Christ flagellated, cut in Heliotrope, the drops of blood being represented by the natural red spots of the stone. The ancients attributed to the Bloodstone a great many virtues, among others that of stopping hemorrhage, and of rendering the person who wore it invincible. The name heliotrope is applied to a flower, into which Ovid. in one of his metamorphoses, says that Apollo converted Clytia while she was, in despair, gazing at the sun.

7. *Agate* (Αχάτης). A variegated chalcedony. The colors are (*a*) banded; (*b*) clouded; (*c*) due to visible impurcities; (*d*) Agatized wood.

(*a.*) Banded. They consist of delicately parallel layers of white, tendon-like, wax-like, pale and dark brown, and black colors, sometimes bluish and other shades. They are always found in the amygdules of igneous rocks as traps, lavas, &c., and their shape depends upon the shape of the original cavity. Thus arise the varied and sometimes grotesque convolutions assumed by the successive layers that make the Agate. If the outline of the cavity was sharp and irregular, then the agate would have many salient angles, such as may be seen in the plan of a fortification. These are the *Fortification Agates.* If the cavity was long and uniform in outline, if it was entirely filled by successive layers, these will, if cut, show a multitude of circular layers bearing more or less resemblance to the pupil of the eye. These are called *Eye Agates.* I have two very perfect ones that I bought with the Chilton collection. I value them at $5.00 and $10.00. If the same cylinder of silica is cut lengthways it shows a series of parallel lines forming what may be called *Ribbon Agate.* Thus art as well as nature may vary the character of Agates. They are quite porous and the colors of polished Agates are

Improved by boiling in oil and sulphuric acid. Sulphate of Iron is also used.

A. Moss Agate is an exceedingly beautiful green or brown variety, showing an appearance exactly like moss through the stone. It seems possible that some, at least, of these, may be true fossils, just as well as the perfect hickory nuts showing meats, and every part perfect that I have collected, in the places where they had been petrified by the siliceous waters of volcanic regions. Phillips says:

"Dr. McCulloch has instituted a very ingenious inquiry into the nature of those vegetable appearances of different colors visible in the more transparent Chalcedonies, which are termed Mocha, and more particularly in those which are less so, termed Agate. Close observation, added to chemical experiment, induce the conclusion, that many of these appearances are owing to the existence in the stone of aquatic Confervæ; that these plants sometimes appear, perfectly in their natural form and color; in others they seem to be coated by oxide of iron, which occasionally hides the form of the plants, and discolors it. Mosses, and some varieties of Lichen, have been observed; and occasionally Chlorite, which sometimes is so disposed as to represent a vegetable. A chrysalis, probably of a moth (?) was observed in an onyx Agate, in a ring in the possession of Earl Powis." Specimens 5 cents to $1.50 each polished.

B. Mocha Stone is the name usually applied to the more translucent varieties of brown moss agate. It is often exactly the color of Mocha coffee, after browning. Specimens polished or unpolished, from 10 cts. to $1.50.

C. Dendritic Agate shows only black arborescent forms through the Chalcedonic base. These markings are probably usually formed by the infiltration of water, containing a salt of manganese in solution, which is afterwards changed to the black oxide, just as moss agates and mocha stones are due to the infiltration of some salt of iron. Specimens 15 cents to $1.00.

D. Agatized Wood, I have showing the grain well, and of almost every color. It forms beautiful ornaments when polished, and makes very handsome microscopic slides. When in the Rocky Mountain region I also collected hickory nuts that had been silicified, even to the meat cavities being filled with a clear chalcedony which resembled the meats of immature nuts. Good specimens 10 cents to 50 cents. Polished 25 cents to $2.00. Slides for microscope, 35 cents each.

E. Brecciated Agate is simply agate which has been broken up and cemented together, by silicious material. It is often as handsome as the most beautiful mosaic work. Good specimens polished, $1.00 to $2.50.

The name agate comes from Achates, the name of a river in Sicily, where many agates were found in ancient times.

Agate was the eighth stone in the high priest's breast plate, and is noted as the type of firmness and consistency.

8. **Onyx** is simply agate, having the layers parallel or in nearly even planes. The onyx is usually of a blackish or brownish color, alternating with layers of white. It was the ninth stone in the high priest's breast plate. It derives its name from the Greek word *onux*, meaning a finger nail. Onyx is found in Oberstein, L. S., Colorado, etc., etc. 5 cents to $1.50 each.

9. **Niccolo** or onicolo, is a brown and white onyx, having a deep brown ground overlaid by a layer of bluish white; the dark ground shows through. 10 cents to 50 cents each.

10. Sardonyx is like onyx in structure, but contains alternate layers of sard of carnelian, and white, black or brown chalcedony, 10 cents to $1,00. 8, 9 and 10 are all very much used for the cutting cameos and intaglios, seals and signet rings. The darker shades are usually left to form the ground. Specimens 15 cents to $5.00.

11. Sard, is the brownish red opaque variety of carnelian, usually appearing blood red by transmitted light. It was the first precious stone in the high priest's breast-plate, and was said by Marbodus to be good to be worn, and to make the person wearing it, beloved of men. It should have engraved on it a vine and ivy-twining around it. 10 cents to $1.50.

12. Agate-Jasper. An agate consisting of jasper, with veinings and cloudings of chalcedony. 25 cents to $3.00.

13. Silicious Sinter. Irregular cellular quartz formed by deposition from water containing silica or soluble silicates in solution. 25 cents to $1.00.

14. Flint. (Silex pt. Plin., Feuerstein Germ.) Somewhat allied to chalcedony, but more opaque, and of dull colors, usually gray, smoky brown, and brownish black. The exterior is often whitish, from mixture with lime or chalk, in which it is imbedded Lustre barely glistening, subvitreous. Breaks with a deeply conchoidal fracture, and a sharp cutting edge. The flint of the chalk formation consists largely of the remains of infusoria (Diatoms), sponges, and other marine productions. The silica of flint, according to Fuchs, is partly soluble silica. There is usually one per cent. or so of alumina and peroxyd of iron, with one or two of water. The coloring matter of the common kinds is mostly carbonaceous. Specimens 5 to 50c.

15. Hornstone. (Silex pt., Plin., Hornstein Germ.) Resembles flint, but more brittle, the fracture more splintery. Chert is a term often applied to hornstone, and to any impure flinty rock, including the jaspers. A grayish chalcedonic hornstone from Marienbad afforded Kersten Si 90.30, Al 3.10, Fe 1.73, Mg 128, Cu 094, Na and K 0.70, H 195. (Jahrb. Min., 1845, 656). 10 cents to 50 cents.

16. Honestone, or Novaculite, from Hot Springs, Ark., closely resembles the above, but is pure white and very closely grained. It is a metamorphosed sandstone. 5 cents to 50 cents.

17. Basanite. Lydian stone or Touch stone. (Lapis Lydius Plin., xxxiii. 43,? Basanites id. xxxvi. 11). A velvet-black siliceous stone or flinty jasper, used on account of its hardness and black color for trying the purity of the precious metals. The color left on the stone after rubbing the metal across it indicates to the experienced eye the amount of alloy. It is not splintery like hornstone. It passes into a compact, fissile, siliceous or flinty rock, of grayish and other colors, called siliceous slate, and also Phthanyte; and then resembles ordinary jasper of grayish and other shades, especially the banded jasper. 10 cts. to 50 cts.

18. Jasper. Impure opaque colored quartz. (a) **Red** (Haematitis Plin., xxxvii, c. 60, not his Haematites), sesquioxyd of iron being the coloring matter. (b) **Brownish**, or ochre yellow, colored by hydrous sesquioxyd of iron, and becoming red when so heated as to drive off the water. (c) **Dark Green** and brownish-green. (d) **Grayish Blue.** (e) Blackish or brownish-black. (f) **Striped** or ribband jasper. (Bandjaspis Germ.), having the colors in broad stripes. (g) **Egyptain** jasper in nodules which are zoned in brown and yellowish colors.

19. Porcelain Jasper is nothing but baked clay, and differs from true jasper in being B. B. fusible on the edges. Red porphyry, or its base, resembles jasper, but is also fusible on the edges, being usually impure feldspar.

C. Besides the above there are also:

1. **Granular Quartz,** or Quartz Rock. A rock consisting of quartz grains very firmly compact; the grains often hardly distinct, 5 cents to 25 cents.

2. **Quartzose Sandstone,** 5 cents to 25 cents.

3. **Quartz-Conglomerate.** A rock made of pebbles of quartz with sand. The pebbles sometimes are jasper and chalcedony, and make a beautiful stone when polished, 5 cents to $2.00.

4. **Itacolumite** or Flexible Sandstone. A friable sand-rock, consisting mainly of quartz sand, but containing a little talc or mica, and possessing a degree of flexibility when in thin laminæ. It is extraordinarily interesting, especially in choice specimens. 10 cents to $1.00.

5. **Buhrstone.** A cellular flinty rock, having the nature in part of coarse chalcedony, 25 cents to 50 cents

6. **Pseudomorphous Quartz.** Quartz appears also under the forms of many of the mineral species, which it has taken through either the alteration or replacement of crystals of those species. The most common quartz pseudomorphs are those of calcite, barite, fluorite, and siderite. (a) **Tabular Quartz** consists of intersecting plates of quartz, and is probably a result of the quartz being deposited among intersecting plates of other minerals as barite or calcite. Good specimens 25 cents to $1.50. (b) **Haytorite** of C. Tripe (Phil. Mag., i, 40, 1827), is a pseudomorph after datolite, $1.50. (c) **Beckite** Duf, is a pseudomorph after coral, chalcedonic in character, from Devonshire, England it contains some of the carbonate of lime of the original coral, (Church, Phil. Mag., IV xxiii. 95), 25 cents to $1.50 each. (d) **Babel-Quartz** is quartz which has impressions of cubes of fluor, arising from its having been deposited over the crystals, 15 and 50 cents to $1.00. (e) **Silicified Shells** are proper pseudomorphs in quartz; they occur through many rock strata, including limestone, 25 cents to $1.50. (f) **Silicified** wood is quartz pseudomorph after wood. The texture of the original wood is usually well retained, it having been formed by the deposit of silica from its solution in the cells of the wood, and finally taking the place of the walls of the cells as the wood itself disappeared. Good specimens, 25 cents to $1.50.

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Actinolite,	5
Agate,	25
Alabaster,	10
Albite,	5
Allanite,	25
Alum-stone,	50
Alunite,	50
Amazon Stone,	5
Amber,	1 25
Amethyst,	25
Amphibole,	5
Anhydrite,	10
Anthracite,	5
Anthophyllite,	10
Antimony,	30
" Sulphide,	25
Apatite,	5
Arkansite,	25
Aragonite,	25
Arsenic, native,	1 00
†Arsenopyrite,	25
Asbestus,	10
Asphaltum,	15
†Astrophyllite,	50
Augite,	5
Azurite,	50
Barite,	5
Barytocalcite,	25
Beauxite,	5
Beryl,	15
Biotite,	25
†Bismuthinite,	50
Bitumen,	15
" Elastic,	50
Bituminous Coal,	5
Blende,	5
Borax,	15
Bornite,	50
Bournonite,	1 50
Brookite,	25
Bronzite,	5
Cairngorm Stone,	5
Calamine,	5
Calc Spar,	5
Cannel Coal,	5
Cassiterite,	25
Celestite,	15
†Cerargyrite,	2 00
Cerite,	1 25
Cerussite,	1 50
Chalcopyrite,	5
Chalcedony,	5
Chalcocite,	1 00
Chert,	5
Chlorastrolite,	4 00
Chloritoid,	10
Chondrodite,	25
Chromite,	15
Chrysocolla,	75
Chrysolite,	5 to 15
Cinnabar,	50
Clay,	5
Coal, Bituminous,	5
" Anthracite,	5
Coccolite,	5
Colemanite,	35
Columbite,	2 00
Copalite,	25
Copiapite,	1 00
Copper,	35
Coprolites,	5
Corundum,	15
Crocidolite,	1 00
" Pseudomorph after,	10 to 25
Cryolite,	15
Cuprite,	50
Cyanite,	10
Datolite,	50
Diatomaceous Earth,	15
Dimagnetite,	75
Dolomite,	5
Dufrenite,	15
†Dumortierite,	25
Edenite,	10
Elaeolite,	25
Elaterite,	50
Electro Silicon,	50
†Embolite,	6 00
Emery,	10
Enstatite,	5
†Epidote,	25
Essonite,	15
Feldspar,	5
Fibrolite,	5
Fibrous Gypsum,	5
Flexible Sandstone,	5
Flint,	5
Fluorite,	5
Fowlerite,	25
Franklinite,	10
Gadolinite,	1 50
Galena,	5
" Argentiferous,	10 to 50
Garnet,	5
†Genthite,	25
Geode Quartz,	10
Glauconite,	5
Gothite,	35
Graphite,	15
Guano,	5
Gummite, per oz.,	2 00
Gypsum, Fibrous,	5
Halite,	5
Heavy Spar,	5
Hematite,	5
Hornblende,	5
Honestone,	5
Hyd. Anthophyllite	5
Iceland Spar,	50 to 5 00
Idocrase,	10
Ilmenite,	5
Iolite,	10
Iron, Chromic,	15
" Magnetic,	10 to 50
" Pyrites,	5
" Ores,	5
Jasper,	5
Kaolin,	5
Labradorite,	5
†Lapis Lazuli,	50
Lava,	5
†Lead Molybdate, 90%,	75
† " " 50%,	25
† " " 15%,	5
" Ore, Galena,	5
†Leucite,	10
Lepidolite,	15
Limestone,	5
Limonite,	5
Lodestone,	10 to 50
Magnesite,	10
Magnetic Pyrites,	15
Magnetite,	5
Malachite,	25
† " 40%,	10
Manganese, Carbonate,	50
" Oxide,	5
" Silicate,	25
Manganite,	50
Marble,	5
Marcasite,	5
Marl,	5
Martite,	10
Masonite,	15
Melanite,	10
Menaccanite,	5
Mercury, Sulphide,	50
Meteoric Iron,	4 00
Mica,	5
Microcline,	5
Molybdate of Lead, see Lead Molybdate.	
Molybdenite,	2 00
Monazite Sand, per oz.	25
Muscovite,	5
Nephelite,	25
Nickel, Silicate,	25
Nigrin,	25
Novaculite,	5
Olivene,	15
Oolite,	5
Opal,	10
Orpiment,	1 00
Orthoclase,	5
Petalite,	50
Petrified Wood,	5
Petroleum,	15
Phlogopite,	15
Pitch, Mineral,	15
Platinum, per oz.,	9 00
Plumbago,	15
Prehnite,	35
†Proustite, per oz.,	1 00
Psilomelane,	5
Pyrite,	5
Pyrites, Auriferous,	25 to1 00
" Copper,	5
" Magnetic,	15
Pyrolusite,	15
Pyromorphite,	1 00
Pyrope,	25
Pyroxene,	5
Pyrrhotite,	15
Quartz, clear,	10
" Ferruginous,	5
" Milky,	5
" Rose,	10
" Smoky,	5
Rhodochrosite,	50
Rhodonite,	25
Rock Crystal,	10
Rose Quartz,	10
Rutile,	25
Satin Spar,	35
Samarskite,	1 00
Scapolite,	5
Schorlomite,	1 00
Selenite,	10
Serpentine,	5
Siderite,	5
Silicified Wood,	10
Sillimanite (Var.),	5
*Silver in rock, from 50 to 90 per cent. silver,	7 50
Smaltite,	2 50
Soda Nitre,	15
Specular Iron,	5
Sphalerite,	5
Sphene,	20
Spodumene,	20
Steatite,	5
Stibnite,	25
Stilbite,	35
Stream Tin,	25
Strontianite,	15
Strontia Sulphate	15
Sulphur,	25
Tabular Spar,	15
Talc,	5
†Telluride Ore,	3 00
Tetrahedrite,	1 50
Tinstone,	25
Titanite,	20
Topaz,	20
Tourmaline,	5
Tremolite,	10
†Triphyllite,	35
†Triplite,	50
Tufa, Calcareous,	5
Turquoise,	1 00
Ulexite,	1 00
Uraninite,	3 00
Vanadinite,	3 00 to 5 00
†Variscite,	5
Vermiculite,	5
Vesuvianite,	10
Vivianite,	15
†Wavellite,	5
Willemite,	20
Williamsite,	10
Witherite,	10
Wolframite,	50
Wollastonite,	15
Wulfenite, see Lead Mol.	
Zinc Blende,	5
" Silicate,	5
Zincite,	50
" and Franklinite,	5
Zircon,	25

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Cacoclasite.

PROF. H. C. LEWIS.

"Crystals essentially square prisms, often nearly cubical, with truncated corners. Often an inch in diameter. Tetragonal. Hemihedral. Planes O, ii, I, 2, 2-i, 2-2, 6-3, the last two probably hemihedral. The angles closely correspond with those of sarcolite, indicating isomorphism with that species.

There is an almost entire absence of cleavage. Lustre, vitreous to resinous.—Hardness, 5-6.—Specific gravity, 3.050-3.057.

Composition, after deducting admixed calcite:

		O. ratio	
$Si O_2$	36.74	.612	6
$Al_2 O_3$	19.79	.199	2
$Fe_2 O_3$	1.33		
$Ca O$	38.16		
$Mg O$	.77		
$K_2 O$	.17	.736	7
$Na_2 O$	.32		
$P_2 O_5$	2.49		
$H_2 O$	23		
	100.00		

The quantivalent ratio of bases to silica is 9:6 or 3:2; thus making the mineral a *subsilicate.*

In Hydrochloric acid, it effervesces for a few moments, on account of the enclosed calcite, but is only slightly dissolved and will not gelatinize, except after fusion.

Before the blowpipe it fuses at 3 with intumescence to a white glass.

Locality: Wakefield, Ontario, Canada, where it is associated with *cubical spinel,* pyroxene, graphite, etc.

Name refers to its poor cleavage."—*Extract from Minutes, Geol. and Min. Section A. N. S., Nov.* 26, 1883.

[The cubical spinel locality, though within ten feet of the other, seems to have no connection with it. I did a large amount of blasting and other work; and could discover no connection between the two deposits. The cubic spinals are even more rare than the Cacoclasite, which is very rare. These were exhibited by me at the September meeting, immediately on my return from collecting them in Canada.—A. E. FOOTE.]

Mrs. E. H. Richards, the first to analyze our Am. Samarskite, and whose good work in connection with the Society for the Encouragement of Studies at Home is so well known, has issued a little work entitled First Lessons in Minerals, intended for use with very young children in the public schools. Although only 32 pages, it is admirably adapted to the purpose for which it is intended. We regret that we have not the author's permission to quote largely from this little work. But as it is the intention to revise it soon, we refrain. We can only say that the course pursued is excellent.

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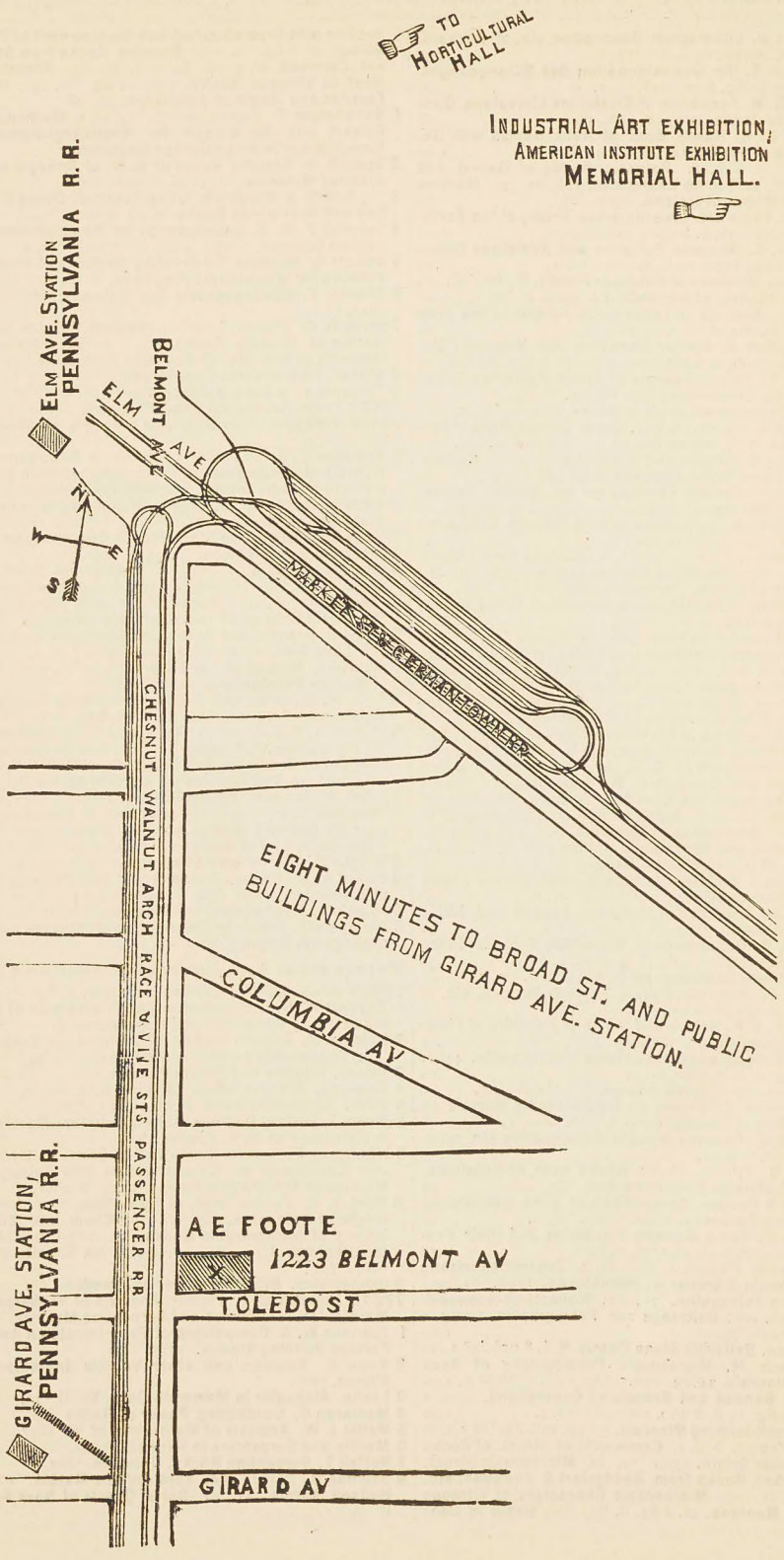
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